MAY 1957

FOUNDRY

A PENTON PUBLICATION

FOUNDRIES CAN

SELL MORE CASTINGS

—p. 130

through . . .

Modern Methods and Materials —p. 134

Research and Product Development —p. 144

An Effective Marketing Program —p. 152

A Case Study of How To Sell —p. 160

AFS CONGRESS AND CASTINGS SHOW
CINCINNATI, MAY 6-10
p. 184

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PROVED BY INDEPENDENT LABORATORY TESTS:

62% S·M·I*

for FERROCARBO®-TREATED IRON

Progressive foundrymen seeking to improve the machinability and quality of gray iron and malleable iron castings can now rely upon FERROCARBO — the patented additive in briquette form — by CARBORUNDUM. Tests by a widely-known independent research organization, have proved conclusively that the addition of FERROCARBO® to the cupola charge results in finer-grained, denser, and stronger castings with a machinability improvement factor as high as 62% over untreated iron. The better *dispersal action* of FERROCARBO and the resulting *better machinability* of the iron, are your assurance of a *better satisfied* customer.

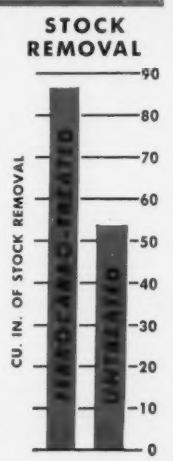
* Surface Machinability Improvement

HOW TESTS WERE CONDUCTED

Tool-wear tests were conducted on metal cast in leading foundries across the country, using untreated iron and Ferrocarbo-treated iron of identical or similar chemistry. Both were machined at commercial speeds using a single point "Carboloy," grade 44A tool. Tool life was determined by measuring wear on the flank of the tool with a 100-power microscope. The charts at the right show actual test data as reported.

➡ **WRITE FOR MORE INFORMATION** on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet — Form A-1409 — Electro Minerals Division, The Carborundum Company, Niagara Falls, New York.

Chemical Analyses	Untreated	Ferrocarbo® Treated
C	3.57	3.56
Si	2.25	2.26
S	.10	.10
Mn	.68	.66
P	.11	.11
Cutting speed (ft./min.)	300	300
Feed (in./rev.)	.009	.009
Depth of Cut (in.)	.062	.062
Wear land (in.)	.015	.015
Vol. of metal removed (cu. in.)	53	86
Weight of metal removed (lbs.)	13.7	22.2
Per Cent improvement		62%



VISIT OUR BOOTH
at the 1st Engineered Castings Show (Booth 202) Cincinnati, May 6-10.

ELECTRO MINERALS DIVISION

The CARBORUNDUM Company

REGISTERED TRADE MARK

FERROCARBO DISTRIBUTORS — KERCHNER, MARSHALL & CO., PITTSBURGH • Cleveland • Buffalo • Philadelphia • Birmingham • Los Angeles • Canada
MILLER & COMPANY, CHICAGO • St. Louis • Cincinnati

84-73

Circle 551 on Inquiry Card

B.F.Goodrich report:

Hurricane of sand roars through hose

B. F. Goodrich improvements in rubber brought extra savings

Problem: To clean rough spots off metal, the workman is using a blast of sand that roars out of a hose nozzle at terrific speed. Efficient for cleaning, but the hurricane of sand was wearing holes through every kind of hose tried on this job.

What was done: When a B.F.Goodrich man heard about the trouble, he recommended a hose, specially developed by B.F.Goodrich to stand this rough treatment. Extra-soft rubber is used for the lining of this sand blast hose, so the sharp, destructive sand simply bounces off the rubber instead of digging in and cutting it to shreds.

Savings: The B.F.Goodrich hose has been on this job 3 years now—longer than any hose used before—and it shows no sign of wearing out.

Extra benefits: It is much lighter than sand blast hose used to be, more flexible, easier for workmen to handle. And there's no danger of workmen being shocked or jolted by static electricity, generated by sand rushing through the hose. Antistatic rubber carries away electric charges as fast as they build up.

Where to buy: Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich hose used in this sand-blasting job. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept.* M-929, *Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Circle 554 on Inquiry Card—Page 51

HERE'S ALL YOU NEED

If it's easier, better sand control you're after—here's the answer! These three materials, added in varying amounts to sand (dry or in slurry), will give you *close control* over green and dry strength and carbon content, and also provide GREATER FLOWABILITY and LESS LUMPY SHAKEOUT!

GREEN BOND Bentonite excels in developing and controlling green and dry strength. Its medium to low viscosity cuts down on mulling time and permits slurry users to add more bentonite per gallon of slurry, without strain on the pumping system. CROWN HILL Seacoal is exceptionally low in sulphur content, which means your castings will have more easily machined surfaces. Federal SAND STABILIZER improves the flowability of sand and eliminates lumps in sand shakeout. It burns out faster than any other facing material. Since it has a very low ash content and has no deteriorating effect on sand, you can re-use your molding sand *safely*.

And this is important—these advantages, plus many others, are yours at low cost. For these sand additives will actually cost you *less than $1.00 per ton of castings produced!* To learn more about them, write for your copy of *"Tailor-Made Molding Sands"*.

FEDERAL

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

FOUNDRY
A PENTON PUBLICATION

May 1957
Volume 85—Number 5

Editorial 129

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Foundries Can Sell More Castings 130
Special editorial report highlights ways and means of selling more castings. Market potentials are outlined; processes, controls and materials are evaluated; research and product development techniques to regain lost business and create new business are discussed; a case study of how one foundry increased its sales is presented, and a practical approach to the requirements of building a marketing program is explained.

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(For addresses of branch offices, see page 403)

READERSHIP Coatings RESEARCH

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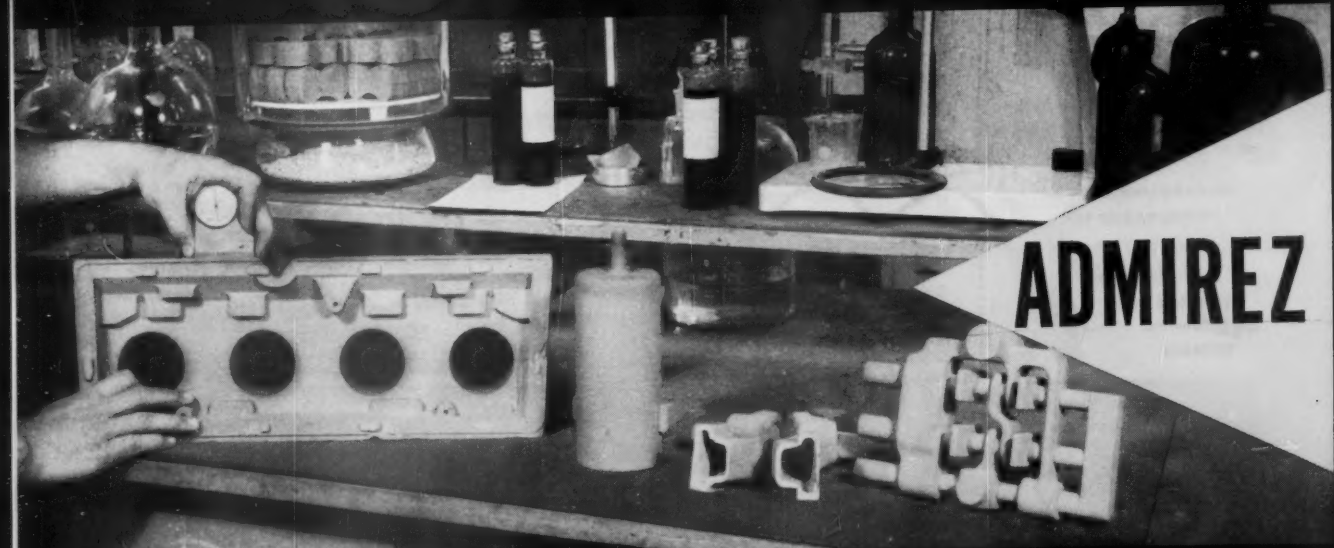
ARCHER · DANIELS

FOUNDRY



2191 WEST 110TH STREET

BEST FOR CO_2 CORES...

An exclusive feature in ADCOSIL is a color indicator that tells when to stop gassing a CO_2 core. The core mix is tinted a royal purple . . . then fades to a natural sand color when the core is cured throughout.

ADCOSIL helps determine where to place core vents and how many to use; helps rig new boxes and patterns; prevents under-gassing, over-gassing; encourages cores designed for most efficient flow of gas; cuts time and costs; saves gas.

Flowability, workability, core hardness, and long bench life are inherent in ADCOSIL sand mixtures.

Several types are available:

For ferrous metals . . . . . ADCOSIL F
For non-ferrous metals . . . . . ADCOSIL NF
For super-collapsibility, all metals. ADCOSIL SC

ASK FOR TRIAL DRUM

ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division
2191 West 110th Street, Cleveland 2, Ohio

Gentlemen: I am interested in trying:
ADCOSIL F ☐
ADCOSIL NF ☐ } Check One
ADCOSIL SC ☐

Name _____
Title _____
Company _____
Address _____
City _____ Zone _____ State _____

MIDLAND COMPANY

BEST FOR AIR SET CORES...

Original LIN-O-SET, introduced by ADM and praised by large jobbing foundries coast-to-coast, is scarcely a year old. Still, a newer and more phenomenal air-setting binder, LIN-O-SET II, is already available to foundries searching for maximum efficiency.

LIN-O-SET II works in room temperature at exceptional speed hardening the "core of the core" almost as fast as the exposed surfaces. An ADM "first", this development takes the guesswork out of drawing, since the curing of a LIN-O-SET II core combines internal polymerization with surface oxidation.

All this . . . plus the better-known LIN-O-SET features; minimum ramming; saving in cleaning time; thorough collapsibility; elimination of excessive rodding; control of set-up time; improved accuracy; elimination of objectionable odors and toxic gases.

ASK FOR TRIAL DRUM

ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division
2191 West 110th Street, Cleveland 2, Ohio

Gentlemen: I am interested in trying LIN-O-SET II.

Name _____
Title _____
Company _____
Address _____
City _____ Zone _____ State _____

PRODUCTS DIVISION

BEST FOR SHELL MOLDS AND SHELL CORES...

ADMIREZ CC-240, newly developed in ADM's Resin Research Laboratory, utilizes a cold coating process. It is a dry powdered product containing a cure catalyst which promotes rapid transformation of the resin from a low-melting-point, alcohol-soluble material to a hard, infusible solid under the influence of heated air.

Two basic improvements are offered by ADMIREZ CC-240 over earlier resins: elimination of sand-resin segregation; reduction of economically prohibitive high resin requirements. Advantages are: fast coating; quick breakdown during mulling; high flowability of coated sand; exceptionally fast cure time; excellent stripping from pattern; high tensile strength and lack of brittleness; low-shell breakage; lack of thermal plasticity.

ASK FOR TRIAL DRUM

ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division
2191 West 110th Street, Cleveland 2, Ohio

Gentlemen: I am interested in trying ADMIREZ CC-240.

Name _____
Title _____
Company _____
Address _____
City _____ Zone _____ State _____

CLEVELAND 2, OHIO

2191 WEST 110TH STREET

...increasing productivity without adding personnel!

Management men in every industry are giving productivity and profits—*as well as personnel*—a lift by integrating Towmotor mass-handling in all operations from receiving to delivery.

Every department benefits. More work gets done. And you don't need more men to do it because Towmotor fork lift truck operators are finding it's *fun* to multiply the handling of materials aided by 12 new Towmotor improvements like these:

- New functional body styling
- New pace-setting comfort features
- New "tight-spot" maneuverability
- New centralized easy-reach controls
- New positive-response hydraulic lift
- Towmotor-improved power steering

Some of the industry's most significant advances in fork lift truck design and performance are shown in Towmotor's latest bulletin #SP-23. See how they help supplement your personnel—permit your men to do a bigger day's work easier—give each operator the power to improve your plant's productivity and profits.

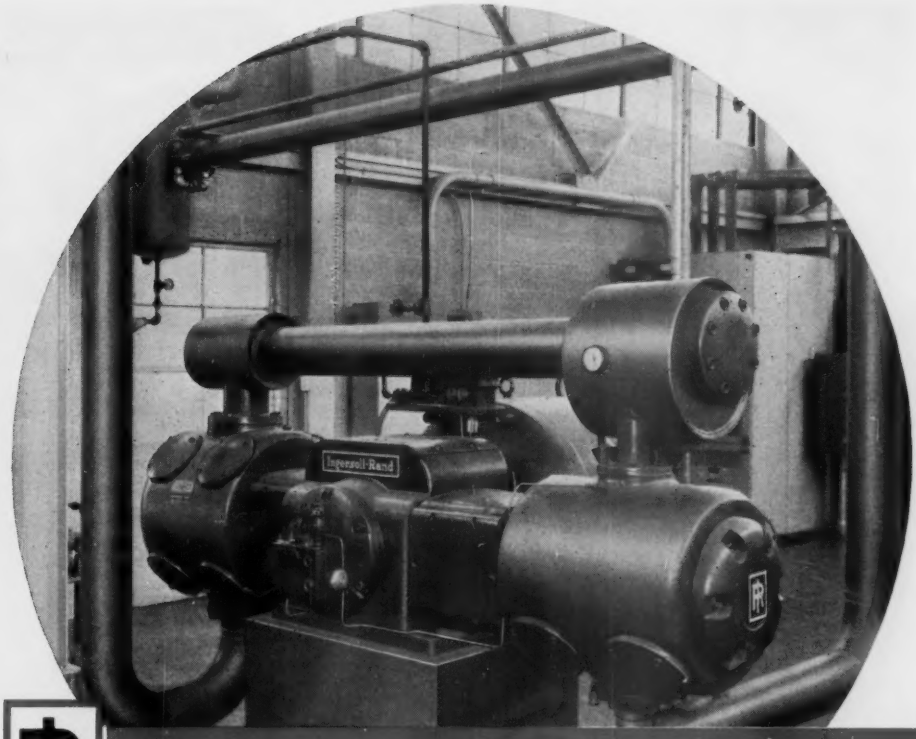
Write Towmotor Corporation, Cleveland 10, Ohio. We'll send the illustrated booklet immediately.

Leaders for 38 years in building Fork Lift Trucks and Tractors

TOWMOTOR® THE ONE-MAN-GANG — GERLINGER

Gerlinger Carrier Company, Dallas, Oregon is a subsidiary of Towmotor Corporation, Cleveland, Ohio

CLEVELAND 2, OHIO



"PHE" COMPRESSOR

serves growing plant-air load at Rotary Electric Steel Co.

WHEN the Rotary Electric Steel Company of Detroit, Mich., increased plant capacity, the existing plant-air supply was also increased by adding the Ingersoll-Rand 100-hp PHE compressor shown above. The extreme simplicity of this installation is obvious at a glance.

The main air supply consists of two Ingersoll-Rand duplex, electric-driven compressors totaling 500 hp. After serving for 40 years they are still giving entirely satisfactory performance.

The new PHE unit is a compact, packaged-type, two-stage air compressor with built-in motor and efficient intercooler. It was shipped completely assembled, ready to run. Installation was simply a matter of mounting the unit on a small foundation and connecting the air, water and power lines. And like many other modern Ingersoll-Rand compressors the PHE has full-floating aluminum bearings that need no adjustments.

Ask your I-R representative for full details on the smooth-running PHE compressor. Its inherent longevity and low maintenance requirements mean big savings in air power costs.

Only I-R Compressors have CHANNEL VALVES

Known the world over for High Efficiency • Quiet Operation
Durability • Air-Cushioned Action • Corrosion-Resistance
Freedom from Warping • Long, Trouble-Free Service

Ingersoll-Rand

1-430

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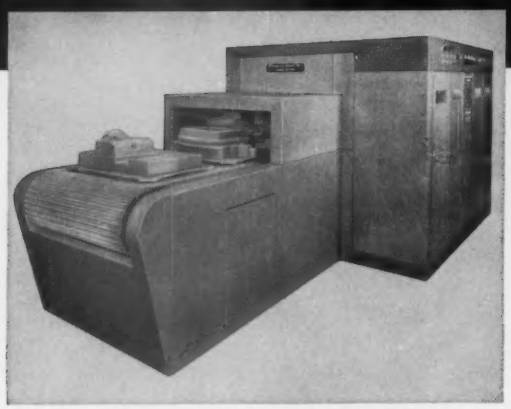
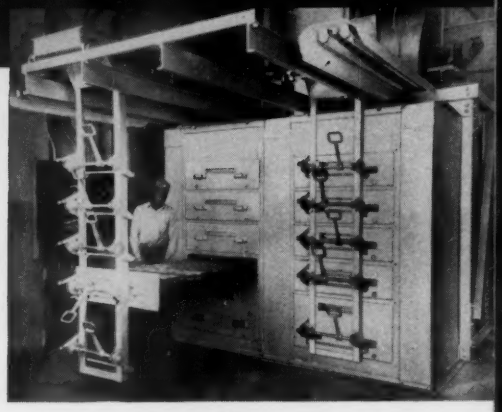
COMPRESSORS • ROCK DRILLS • AIR & ELECTRIC TOOLS
GAS & DIESEL ENGINES • TURBO-BLOWERS • PUMPS

Coleman Transrack Ovens

Coleman Car Type Mold Ovens



Coleman Dielectric Oven



Coleman Rolling Drawer Ovens

Only COLEMAN offers a complete line of foundry ovens with all these advantages

RECIRCULATING HEATING OR DIELECTRIC SYSTEMS to meet your requirement best.

DEPENDABLE BAKING AND DRYING. Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you—gas, oil, stoker-coal, electricity, etc.

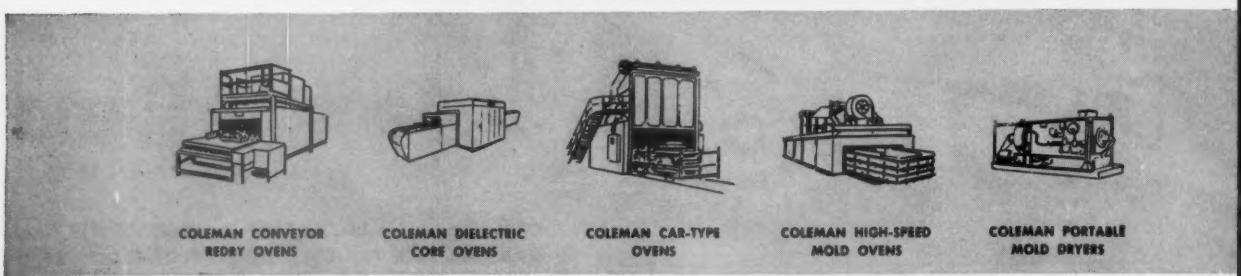
FLEXIBILITY AND ACCURATE CONTROL to bake oil or resin binders—whichever is most satisfactory for your requirements.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases—helps to make the core department a good place to work.

ADVANCED OVEN "KNOW-HOW". Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work.

WIDEST EXPERIENCE. Gained through 50 years of specialization in foundry ovens and the building of more than 11,000 successful Coleman Oven installations.

Let us recommend the RIGHT type of core or mold oven for your requirements — we make them ALL!



COLEMAN CONVEYOR REDRY OVENS

COLEMAN DIELECTRIC CORE OVENS

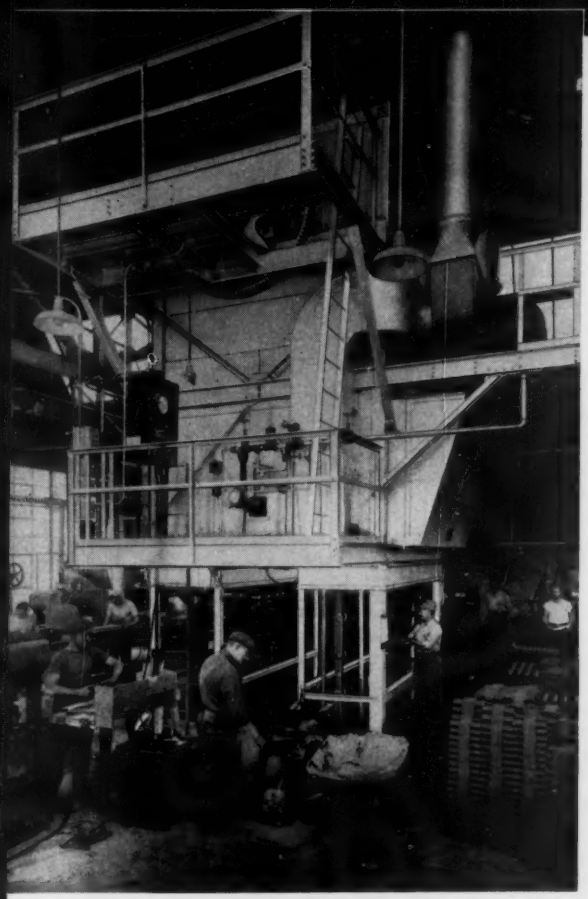
COLEMAN CAR-TYPE OVENS

COLEMAN HIGH-SPEED MOLD OVENS

COLEMAN PORTABLE MOLD DRYERS

better production costs less with

COLEMAN OVENS



Coleman Tower® Oven

FAST, EFFICIENT production of uniformly good cores and molds is a major factor in increasing foundry profits. Actual performance records in all classes of foundries show that Coleman Ovens are a profit making investment because they are reducing overall core department costs by as much as 50%.

Outdated ovens may be the most expensive equipment you own. They cannot compete against the modern design and exclusive advantages of Coleman Ovens which are reflected in substantial production economies. Investigate the savings you would realize from Coleman Ovens.

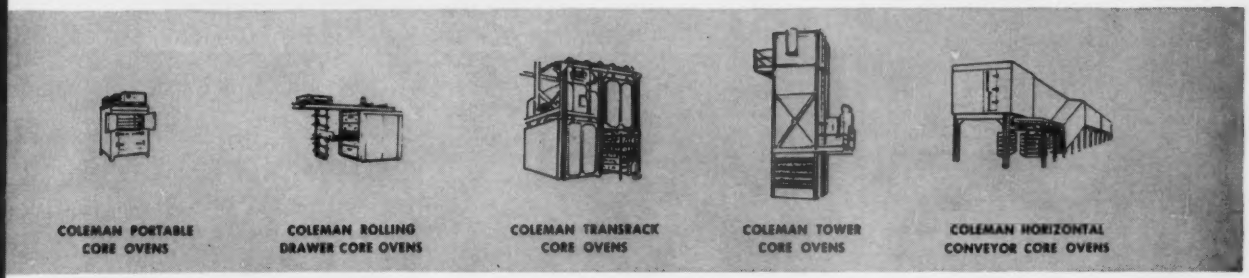
MORE THAN HALF A CENTURY of specialized foundry oven engineering experience is your assurance that the Coleman Oven recommended to you will do your work to your complete satisfaction. Our experienced oven Engineers will give you practical suggestions for your particular requirement.

THE FOUNDRY EQUIPMENT COMPANY

1825 Columbus Road • Cleveland 13, Ohio

World's Only Complete Line of Foundry Ovens

● WRITE FOR BULLETIN 54



COLEMAN PORTABLE CORE OVENS

COLEMAN ROLLING DRAWER CORE OVENS

COLEMAN TRANSRACK CORE OVENS

COLEMAN TOWER CORE OVENS

COLEMAN HORIZONTAL CONVEYOR CORE OVENS

Circle 559 on Inquiry Card—Page 51

How **HOT** is your sand?

← **600°?**
USE IMPERIAL SUPER-INSULATED SAHARA BELTING

← **450°?**
USE IMPERIAL INSULATED SAHARA BELTING

← **300°?**
USE IMPERIAL STANDARD SAHARA BELTING

Imperial* Sahara Brand Belts for foundry conveyor and elevator service are job-designed for specific temperatures. High heat resistance is obtained through use of Imperial's exclusive impregnating compounds which are combined with special heat insulating members and especially developed abrasion resistant and high temperature resistant materials. The Imperial INNER-LOCKED* construction gives protection against damage from ripping and abrasion. By installing the right Imperial Belt for your operation you obtain the lowest ultimate hot belt cost. Call in your Imperial sales engineer for recommendations.

*Reg. Trademark of Imperial Belting Co.

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Mail this coupon for FREE Belting Catalog and Engineering Handbook

Please send new Belting Catalog to:

Name_____

Address_____

With the Editors

SELL More Castings: This issue contains the editorial report on "Foundrymen Can Sell More Castings." It represents quite an effort, covering 38 pages starting on page 130. We hope you will find it interesting and that it will stimulate thinking on how you can develop larger markets. But this presentation does not exhaust the subject by any means. Therefore, future issues will carry other articles directed along the lines of the general theme "Sell More Castings." We suggest that you watch for them.

—o—

Forecasting: The other day one of my good friends in the trade association field complained that all of the forecasting and predicting undertaken by many individuals and organizations, including business publications, only tends to confuse the average businessman. This is probably true, but I find that these business men always seem anxious to gather opinions as to what others think will happen in the near and more distant future. Of course, so many of us like to look into the crystal ball or to present conclusions based on data gathered in the field that this business of forecasting probably will continue to thrive, and business paper editors will continue to indulge in that activity or will publish the forecasts of others.

All of this comes to mind when I read that Howard F. McCullough, general manager, Service Shops Department, General Electric Co., Schenectady, N. Y., recently stated that during the next decade, maintenance will become the most important function of industrial management.

With the United States doubling its productive capacity on a ten-year cycle, and with mechanized production techniques demanding more maintenance man-hours, Mr. McCullough estimates that during these ten years, the increase in maintenance workers will exceed that of people occupied in production.

Surely such a prediction should give the foundry industry much food for thought.

—o—

The Editors: Not long ago when the editors were engaged in a planning session, looking toward some of the issues in the summer and fall, George Pope, business manager, and Dave Gibbs, manager, market research and promotion, came along with a photographer to take a picture of this hard-working group for some future promotion that Pat Dwyer Jr. has in mind for FOUNDRY. These boys got the pictures they wanted and then the photographer suggested we put away the cares of editorial planning and smile once. We tried it, he got a picture, and we are presenting it on this page so that you, "Dear Reader," can see that editorial work is not always serious business.

Reading from the left around the table: Ken Mountain, Virginia Taylor, Jack Miske, Ed Bremer, Frank Steinebach, Bill Gude, Virginia Harms, Don Cadot and Bob Herrmann.

No remarks, please!

—o—

Western Hospitality: Managing editor Bill Gude reports that the West continues to maintain its high standard of hospitality. He spent two weeks on the Coast recently visiting foundries and attending the California Regional Foundry Conference at Berkeley.

Bill says that Charlie Marshall, conference chairman, and his committeemen did a fine job arranging details and taking care of visitors. Seward Shaver, housing chairman, was so busy looking after others that he almost ended up without a hotel room for himself.

Bill is especially grateful to a num-

Extra stamina built into BAKER gas trucks makes them ideal for metalworking plants

One look at any of the Baker "FG" line of gas-powered fork trucks will show you why it is recognized as the most rugged in its class. But there are many things you don't see: the heavy-duty engine, designed expressly for industrial truck service; the sturdy Timken-power axle – integrated with the engine, transmission and clutch into a single unit, engineered for trouble-free service and long life; the Baker wide-angle steering axle – mounted longitudinally in jumbo rubber blocks to provide stability and absorb road shocks; the all-welded box-type frame with securely bolted counterweight; the channel-frame uprights with bronze inserts properly spaced to minimize sliding wear and add security in extended position.

These are but a few of the built-in features that mean more time on the job and more efficient performance in metalworking plants – where the work is heavy and the going rough.

Baker Gas Trucks are available in 2,000 to 7,000 pound capacities. For specific information, contact your nearest Baker sales office or write us direct.

Baker®
industrial trucks

THE BAKER-RAULANG COMPANY
1223 WEST 80th STREET • CLEVELAND 2, OHIO
A Subsidiary of Otis Elevator Company

TG22

Circle 560 on Inquiry Card—Page 51

HAUSFELD

METAL MELTING **FURNACES**

FOR

BRASS—ALUMINUM—MAGNESIUM

AND ALL OTHER NON-FERROUS METALS AND ALLOYS

GAS OR OIL FUELS

TILTING AND NON-TILTING TYPES

SINGLE AND MULTIPLE BURNERS

AUTOMATIC PROPORTIONING SINGLE VALVE CONTROL ASSURES UNIFORM RESULTS WITH MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.

300-320 MOORE STREET, HARRISON, OHIO

ber of foundrymen who took time to show him through their plants. They include Earl Paltenghi and Harold Henderson of H. C. Macaulay Foundry, Peter Caird of Santa Rosa Brass, Thornton Bunch and Mike Furey of Mare Island Navy Yard, Gordon Martin of Atlas Foundry, A. T. Nilles of Griffin Wheel, Walter Dunn of Pacific Alloy, and Bert Aamodt and John Torley of National Malleable.

—o—

Hard at it at 81: Last February, Charles Zahn, superintendent of the foundry, Vilter Mfg. Co., Milwaukee, celebrated his 81st birthday, but his associates will tell you that he does not show his age and shows no signs of slowing up.

Charlie started as a molder with Vilter back in 1913, was promoted

to foreman in 1916, became assistant superintendent in 1926 and superintendent in 1939. He has been active in the work of the American Foundrymen's Society, and marked his birthday by attending a meeting of the Wisconsin Chapter. He has held chairmanship of such committees as the Apprentice Division, Wisconsin Regional Conference, and Wisconsin Old Timers. At present he is a member of a committee devoted to the analysis of castings defects.

Congratulations, Charlie, on a wonderful record of service. And since you believe that a man is as good as he feels, keep feeling good for a long time to come.

—o—

Convention: The 61st annual convention of the AFS and the 1st Engineered Castings Show will be held in Cincinnati, May 6-10. Most of the editorial and business staff will be present. Hope we will see you there.

—F.G.S.

Circle 562 on Inquiry Card—Page 51

If you're in a hole . . .

. . . .BECAUSE OF HIGH CLEANING ROOM COSTS, there's an easy way to cut snagging time and get back on top of the situation. Switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding development in years.

It doesn't take any digging to find out what our customers think of CINCINNATI (PD) SNAGGING WHEELS. They're outspoken in their praise of the fast, easy cutting action. Our customers report, too, that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

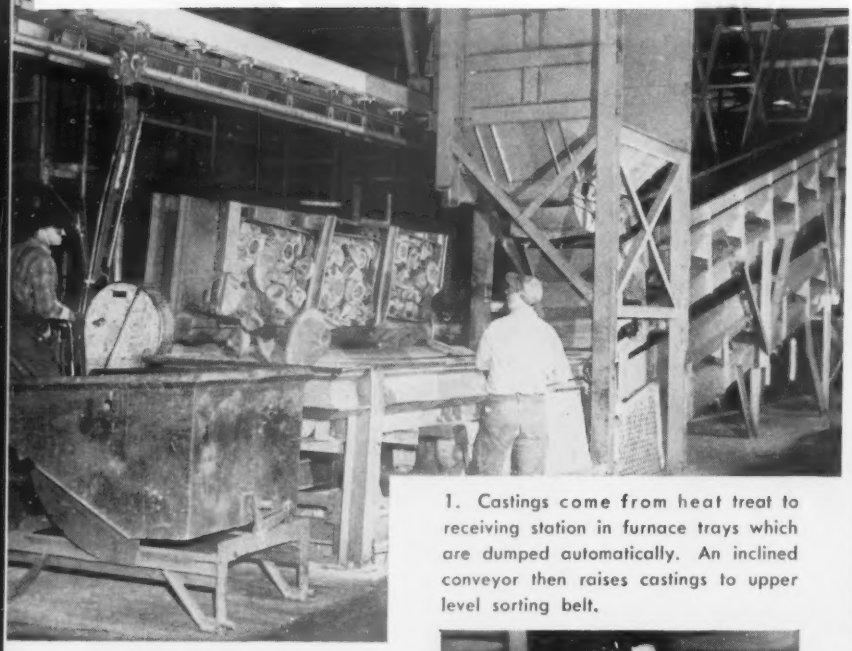
So, if you want back on solid ground again, see your CINCINNATI Grinding Wheels Distributor. Or, contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION.

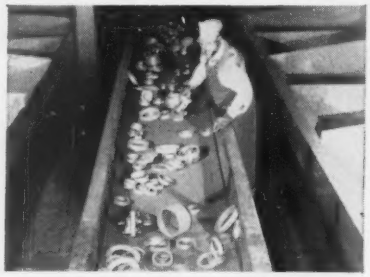
CINCINNATI° *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

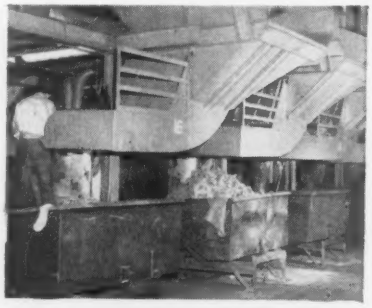
°Trade Mark Reg. U.S. Pat. Off.



1. Castings come from heat treat to receiving station in furnace trays which are dumped automatically. An inclined conveyor then raises castings to upper level sorting belt.



2. Castings are picked from sorting belt and dropped into segregating hoppers. Any castings missed as they pass their particular segregating stations are recirculated back past the stations automatically. This system is very flexible, since many different castings can be sorted; or the same volume, but with only a few different castings, may be sorted.



3. The sorted castings are carried by gravity from the segregating hoppers to a convenient work level at the grinders. After grinding they are dropped into dump hoppers for distribution.

Overhead Sorting and Grinding System . . .

Engineered by PLANET...

Saves Foundry Time, Labor and Space

This overhead sorting and grinding system was recently designed, engineered and installed by the Planet Corporation.

In operation only a short time at a large midwest malleable iron foundry, it has already proven it will increase production and reduce labor costs.

You can increase the efficiency of your plant with Planet foundry automation. Whatever your specific problem may be, Planet foundry specialists can solve it in a way that will cut your costs. For further information, with no obligation, write or phone today.

IT PAYS TO PLAN WITH PLANET

PLANET CORPORATION

1818 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

CALENDAR of Meetings

Apr. 29-May 3—Seventh National Materials Handling Exposition, Convention Hall, Philadelphia.

Apr. 30-May 1-2—Investment Casting Institute, annual spring meeting, Sheraton Park Hotel, Washington.

May 6-10—American Foundrymen's Society, 61st annual convention and 1st Engineered Castings exhibit, Cincinnati.

May 8-9—Non-Ferrous Founders' Society, annual meeting, Netherland Hilton Hotel, Cincinnati.

May 16—Hoist Manufacturers Association Inc., annual meeting, Mayflower Hotel, Washington.

May 17-18—American Institute of Mining, Metallurgical and Petroleum Engineers, New England regional conference, Hotel Statler, Boston.

May 19-22—Industrial Heating Equipment Association, spring meeting, Homestead, Hot Springs, Va.

May 20-23—Design Engineering Show, Coliseum, New York City.

June 10-11—Magnesium Association, summer meeting, Homestead, Hot Springs, Va.

June 11-13—Western Plant Maintenance and Engineering Show, Civic Auditorium, San Francisco.

June 13-14—Malleable Founders' Society, annual meeting, Broadmoor, Colorado Springs, Colo.

June 16-21—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N.J.

June 20-21—American Foundrymen's Society, 2nd annual foundry instructors' seminar, Kellogg Center, Michigan State University, East Lansing, Mich.

June 20-22—Penn State Foundry Conference, sponsored by Pennsylvania State University in co-operation with AFS chapters in New York and Pennsylvania and several independent foundry groups. Pennsylvania State University, University Park, Pa.

June 23-25—Alloy Casting Institute, annual meeting, Homestead, Hot Springs, Va.

June 27-28—Refractories Institute, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Sept. 9-13—Instrument Society of America, 12th annual instrument automation conference, Cleveland.

Sept. 17-20—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 23-24—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 26-28—Missouri Valley Regional Conference, sponsored by St. Louis, Tri-State and Mo-Kan chapters, AFS, and Missouri School of Mines Student Chapter, Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 3-4 — Michigan Foundry Conference, sponsored by Central Michigan, Detroit, Saginaw Valley and Western Michigan chapters, AFS, in co-operation with Michigan State University and University of Michigan. Kellogg Center, Michigan State University, East Lansing, Mich.

Oct. 9-11—Gray Iron Founders' Society, annual meeting, Drake Hotel, Chicago.

Oct. 12-15—Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

Oct. 17-18—Magnesium Association, annual convention, Biltmore Hotel, New York.

Oct. 17-19—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 21-25—National Safety Council, national safety congress and exposition, Conrad Hilton Hotel, Chicago.

Nov. 4-8—American Society for Metals, national metals exposition and congress, International Amphitheatre, Chicago.

Nov. 7-8—National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York.

Nov. 11-13—Steel Founders' Society of America, technical and operating conference, Hotel Carter, Cleveland.

←Circle 564 on Inquiry Card

Soffel's THERMOTOMIC HoTop Gives Full Measure Value

THERMOTOMIC HoTop is the efficient and economical "shorthead" compound for Iron and Steel Castings. It generates heat up to 4000° Fahrenheit. It gives sound shrink-free castings with savings up to 65% of the feeding metal because the height of the feeding riser can be reduced to one-half the diameter or less.

This reduction permits lower copes, less sand handling and ramming with saving of production time and cost.

Ask your nearest PMP Distributor for a demonstration of Soffel's THERMOTOMIC HoTop Liquidizer and samples of Soffel's Fluxes.

PMP CO.

UNITED STATES:

ARLINGTON 74, MASSACHUSETTS
Malcolm G. Stevens
78 Summer St.
PHONE: MI 8-4112 · 8-4113

BIRMINGHAM, ALABAMA
Foundry Service Company
2321-2329—29th Ave., No.
PHONE: Birmingham 4-4754

BOSTON 11, MASSACHUSETTS
Klein-Farris Co., Inc.
683 Atlantic Ave.
PHONE: Hancock 6-1210

BUFFALO 12, NEW YORK
Frederic B. Stevens, Inc.
93 Stone St.
PHONE: Taylor 2091

DETROIT 16, MICHIGAN
Frederic B. Stevens, Inc.
1800—18th St.
PHONE: Tashmoo 5-0725

EDWARDSVILLE, ILLINOIS
Midwest Foundry Supply Co.
270 W. Union St.
PHONE: Edwardsville 76

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Eltex Chemical Company
1803 Dallas Ave.
PHONE: Fairfax 3-3262

INDIANAPOLIS 7, INDIANA
Frederic B. Stevens, Inc.
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KANSAS CITY 2, KANSAS
Lloyd Canfield Foundry Supplies
Inter-State Storage Bldg., 1721 Minnesota Ave.
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LOS ANGELES 22, CALIFORNIA
Pacific Graphite Co., Inc.
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PHONE: Raymond 3-5215

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PHONE: Capitol 7-3683

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Carl F. Miller & Co., Inc.
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2 Armin St.
PHONE: Woodland 1-5097

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Canadian Hanson & Van Winkle Co., Ltd.
Silver & Morrow Aves.
PHONE: Kenwood 1136

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C. C. MacDonald
1723 Dufferin St.
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Overseas Commodities, Ltd.
750 Industrial Ave.
PHONE: Tatlow 8531

VANCOUVER, B. C.
Shanahan's Ltd.
1050 Glen Drive
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PITTSBURGH METALS PURIFYING CO., Inc.
1352 Marvista St., N. S. Pittsburgh 12, Pa.

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

LANSING, MICHIGAN

● STEEL FABRICATION

←Circle 564 on Inquiry Card

Q. How can DRAGOON "carbon fortified" lining materials help you lower maintenance costs . . . improve casting quality?

Dragoon Plastic (Wet). Packed in 100 lb. moisture-proof carton.

Dragoon Plastic (Dry). Packed in 50 lb. and 100 lb. bags.

Dragoon Mortar Coating & Ladle Wash. Packed in 50 lb. and 100 lb. bags.

A. DRAGOON forms a long-lasting, penetration-resistant lining that prevents slagging, bridging, skulling . . . lubricates the flow . . . keeps metal pure . . . castings clean.

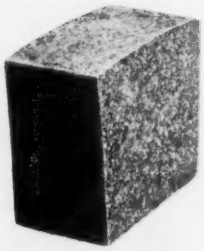
Dragoon Plastic (Wet) comes in convenient, ready-to-use slices for hand or air hammer ramming. Forms a solid monolithic lining in cupola wells, breasts, and ladles that will not shrink, crack or erode out. Reduces lining repair . . . promotes cleaner equipment . . . cleaner casting.

Dragoon Plastic (Dry) is mixed with water to any consistency for ramming. It can be rammed in against safety linings to form a solid refractory structure that will not shrink away or spall. It reduces maintenance costs through easy installation . . . long service life. It's an ideal product for gunning in production shops.

Dragoon Mortar Coating and Ladle Wash is mixed with water for spraying or brushing on over existing linings. It forms an impermeable coating for lubrication and slag resistance.The Dragoon product will pay off by eliminating liner repairs when used as a wash coat for ladles and cupola spouts.

DRAGOON CARBON CUPOLA BLOCK resists slagging, penetration, abrasion . . . outlasts other refractory block 5 to 1. Is ideal for production shops with long heats.

DRAGOON Carbon Block available in all standard cupola blocks and special sizes.



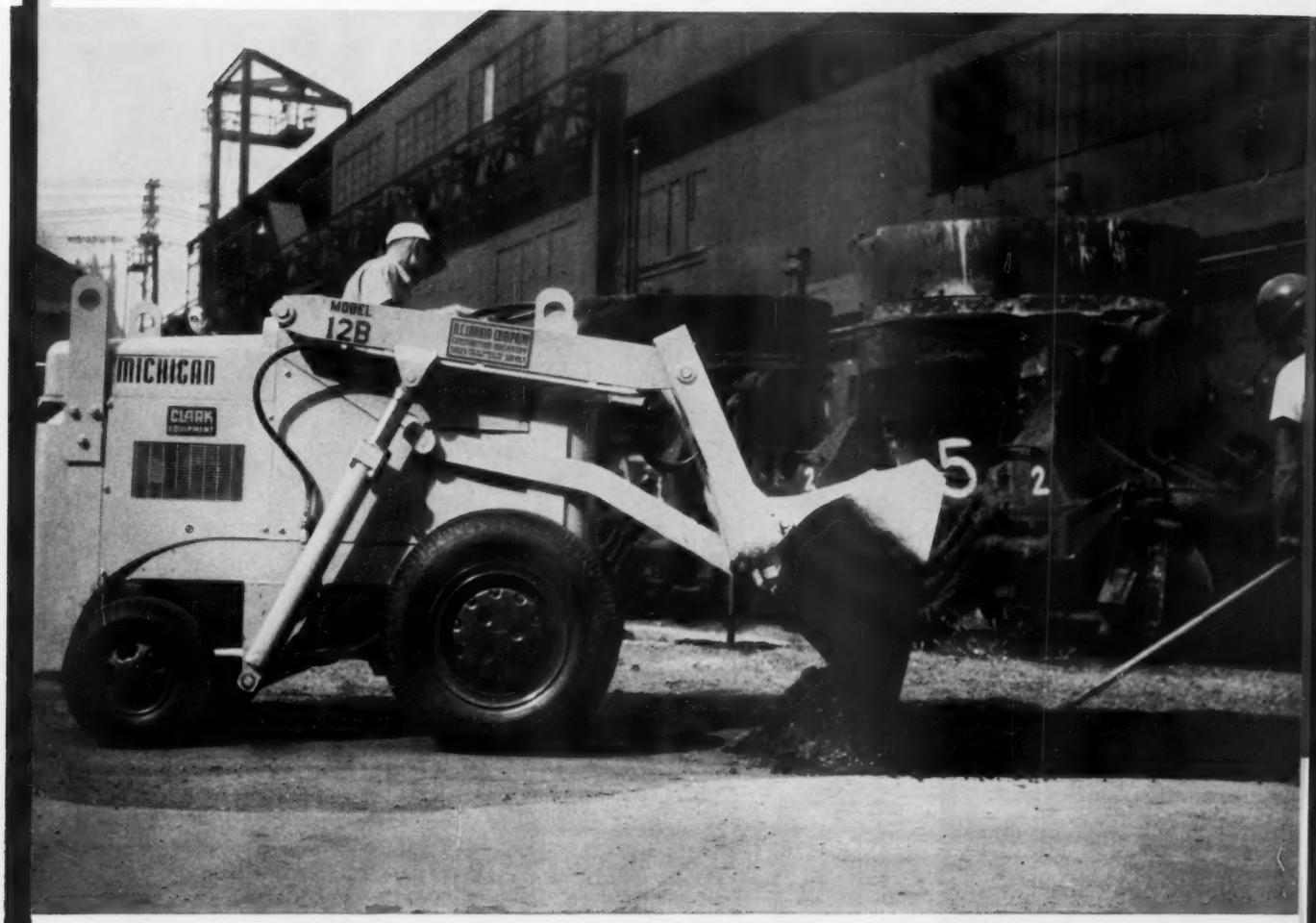
This exclusively formulated, carbon fortified block will give superior service in cupola wells, spouts and ladle linings. Heat of the molten metal forms a fused surface on the hot face of the block, entrapping the carbon and preventing oxidation. This tough shell resists abrasion and penetration, yet allows carbon to come through, lubricating each heat. The result is extended service life . . . cleaner, easier casting.

TEST DRAGOON PRODUCTS under your own conditions and prove their superior workability and service features. Write for complete information.

Dragoon

is a product of SIVAD CERAMIC CORPORATION, Oak Hill, Ohio

Associated Companies: The Davis Fire Brick Co., The Ohio Fire Brick Co., The Cambria Clay Products Co.



United States Steel Corporation makes varied use of Michigan Tractor Shovel

. . . as *"mechanized handyman"*

Yard maintenance . . . snow removal . . . barge cleanup . . . all of these used to require an assortment of labor and equipment at the huge South Works of U.S. Steel. But now these—and other—jobs are handled quickly, efficiently, economically by the "mechanized handyman" shown . . . a 16 cubic ft Michigan Model 12B Tractor Shovel.

This compact, fast-moving Michigan also materially reduces the cost of maintaining roads and other facilities. Fitted with a towing hook, it often pulls a trailer—then loads it on the spot with asphalt, sand, gravel, dirt or trash.

Its high speed, weight and power can be quickly noted on the job of cleaning up the manganese in barges. Clean-up here used to require laborers with shovels to scoop tailings into piles or boxes that cranes could handle. But an improvement over this method was found. Now a crane simply lowers the Michigan into a barge. Maneuvering easily in the limited space, its power and weight help quickly to scrape and load the last traces of heavy manganese, thus saving hundreds of man-hours every month.

If you can use the services of a "mechanized handyman" like this, why not try one *right in your own plant.* Your local Michigan Distributor will be glad to arrange a demonstration at your convenience. He'll also study your situation, recommend the Michigan model best suited to it. Available sizes: 6 cubic *feet* to 6 cubic *yards;* over 35 different buckets and attachments to customize your Michigan. Many purchase plans, including the famous Clark Lease-Purchase which lets you put a Michigan to work without spending a cent of capital.

Michigan is a registered trade-mark of

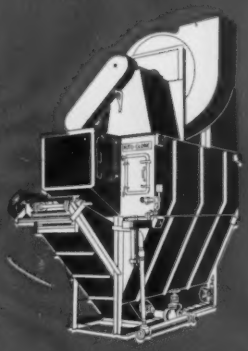
CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Road
Benton Harbor 19, Michigan
In Canada: Canadian Clark, Ltd., St. Thomas, Ontario

CLARK® EQUIPMENT

Circle 567 on Inquiry Card—Page 51

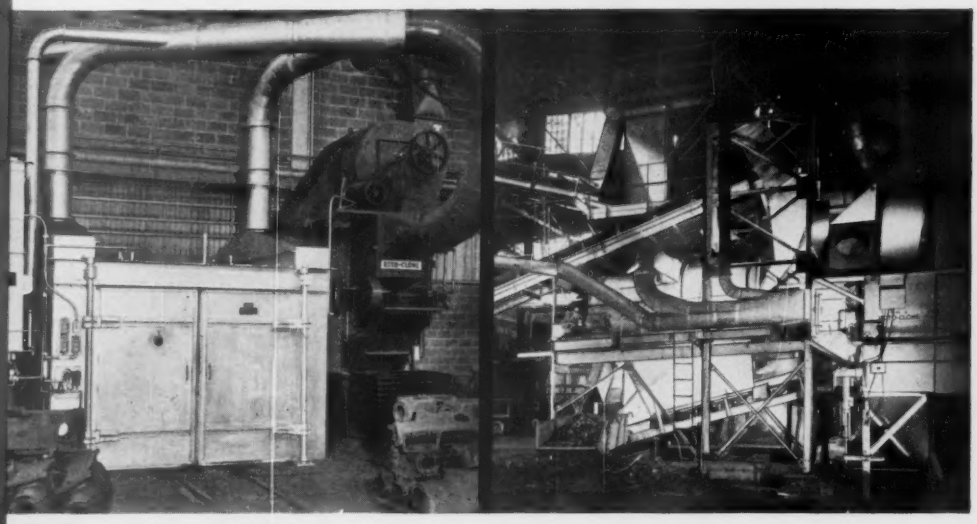
Better Air Is Our Business

Type N ROTO-CLONE



ABRASIVE CLEANING, SAND HANDLING

The Type N ROTO-CLONE is widely used for exhausting both abrasive cleaning (below left) and sand handling operations. High cleaning efficiency of this hydrostatic precipitator results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. Automatic sludge ejector provides for easy disposal of collected material. Bulletin 272.



AAF fights foundry

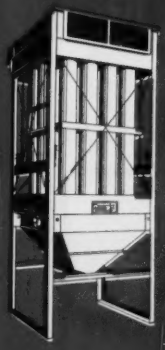
GRINDING

Type D ROTO-CLONE

The usual recommendation for snag, portable and swing frame grinding dust is the Type D ROTO-CLONE which combines exhauster and separator in a compact, self-contained unit. It draws in the dust-laden air, delivers the collected material to the storage hopper and expels the cleaned air —all in a single operation with only one moving part: the impeller. Bulletin 272.

High efficiency, low cost and small space requirements make AAF's Type W ROTO-CLONE a favorite for shakeout operations. Water sprays extend the effectiveness of the dynamic forces to the collection of the lightest and finest dust particles. Requires little maintenance, uses a minimum of water and maintains efficiency regardless of variation in air volume. Bulletin 274.

AMERjet

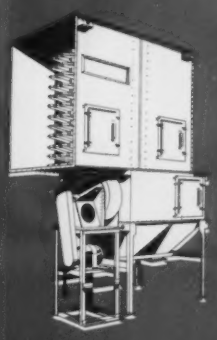


ELECTRIC MELTING FURNACE

The AMERjet Fabric Dust Arrester is recommended for metallic fumes from electric melting furnaces. Reverse jet principle allows velocities through the cleaning media up to 5 times greater than ordinary fabric collectors. Constant air volume is assured by constant, automatic and continuous reconditioning of cleaning tubes. Bulletin 279.

AAF's AMERclone dry centrifugal, originally designed for boiler fly ash, is the answer to cupola stack gases. Not a cinder-catcher, the AMERclone traps the fine particles that often settle on parking lots and surrounding neighborhoods. One AMERclone handles two cupolas alternately, assuring full-time utilization of equipment. Bulletin 291.

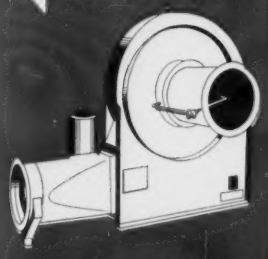
AMERclone



CUPOLA

dust on all fronts

SHAKEOUTS



Type W ROTO-CLONE

Where is process dust causing you trouble?

GRINDING? SHAKEOUTS?
ABRASIVE CLEANING? CUPOLAS?
SAND HANDLING? MELTING FURNACE?

Only a complete line of versatile dust control equipment can successfully fight the plant-wide battle against foundry dust. And the world's most complete line is AAF. It includes hydrostatic precipitators, dynamic precipitators, dry centrifugals and fabric arresters.

AAF's 20 years experience in foundry dust control assures the right unit for every dust-producing operation, regardless of type of dust or concentration. Every product in the line, what's more, offers the basic design features you expect from AAF:

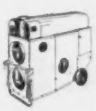
- **Small space requirements**
- **Maintained performance over a wide range of operating conditions**
- **Constant exhaust volumes**
- **High collection efficiency**

Here they are—AAF's "stable of champions" for foundry dust control. One of them will answer *your* dust problem. For more information on any or all, call your local AAF representative or write direct.

AAF
herman nelson

American Air Filter — BETTER AIR IS OUR BUSINESS —
COMPANY, INC.
266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Herman Nelson Portable Heaters



Illinois Steam Heating Specialties

AAF Electric Furnace Hoods

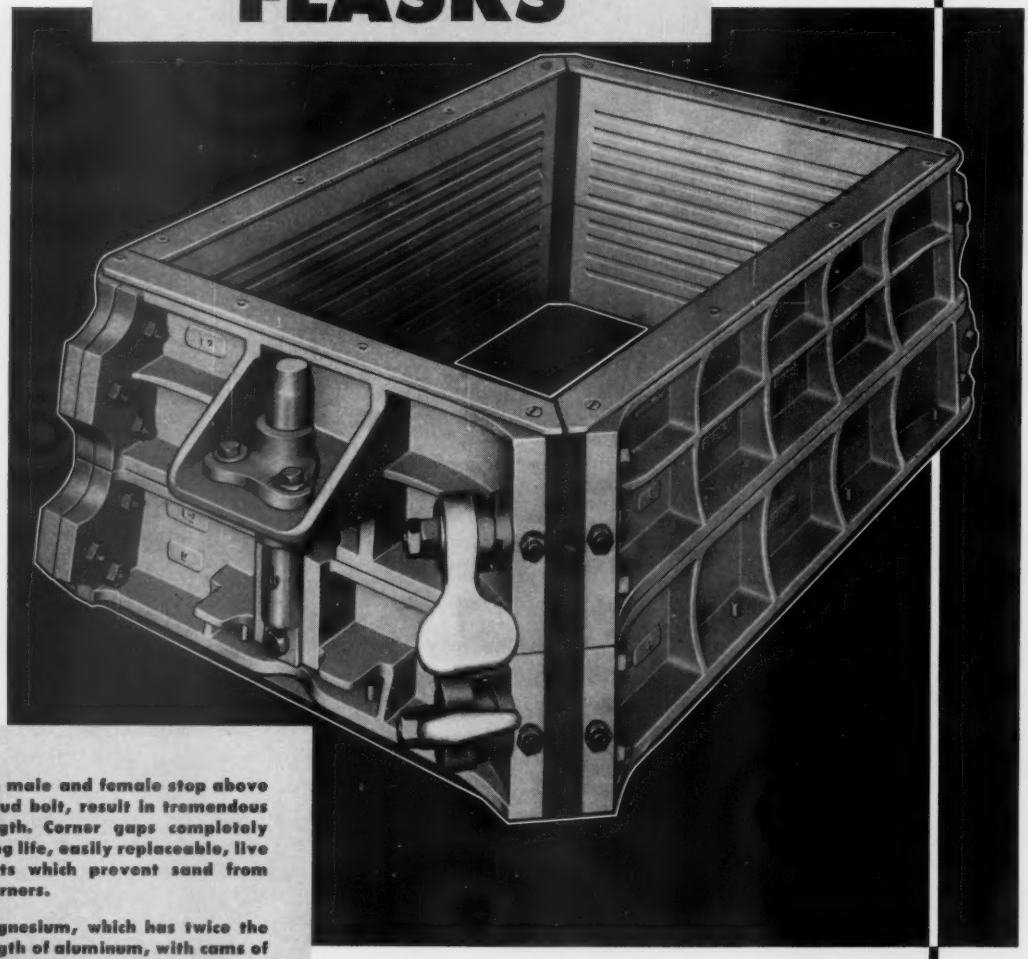
AAF Type K Exhauster

Circle 568 on Inquiry Card—Page 51

No Other Flask Gives You All These Advantages

sturdy

Fremont SPREADLOCK FLASKS



■ Two-piece male and female stop above and below stud bolt, result in tremendous corner strength. Corner gaps completely closed by long life, easily replaceable, live rubber inserts which prevent sand from lodging in corners.

Made of magnesium, which has twice the tensile strength of aluminum, with cams of hardened steel forgings, the Spreadlock assures long service.

Magnesium weighs ⅓ less than aluminum, so they are light in weight, easier to handle.

Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure exacting work.

Write today for free literature and prices.

The Fremont FLASK Co.

FREMONT, OHIO

Circle 569 on Inquiry Card—Page 51

BLAST!

the Hard-to-get-at spots.....

Quickly and Economically

with

Norbide® Pressure Blast Nozzles

You'll find there's a NORBIDE Nozzle available to give you exactly the type of cleaning stream you need — from a pencil-thin stream for cleaning hard-to-get-at spots to a broad stream for large areas. And NORBIDE Nozzles - lined with the hardest manufactured material commercially available — maintain stream contour, last longer than any other nozzle made and deliver maximum blasting efficiency at minimum cost per hour.

NORTON COMPANY
43 New Bond St., Worcester 6, Mass.

NORTON®
BORON CARBIDE
Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

NORBIDE®... The Longest Nozzle Life You Can Buy

Circle 570 on Inquiry Card—Page 51

FREE

write for new brochure
"Sand Magic with Plasti-Bond"

You can really do sand tricks with Plasti-Bond, tricks that will give you a lot of practical help on your troublesome sand problems. It's well worth your while to investigate.

MINERALS International CHEMICALS

EASTERN CLAY PRODUCTS DEPT.
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
20 North Wacker Drive • Chicago 6

DIXIE BOND · BLACK HILLS BENTONITE · REVIVO BOND · PLASTI-BOND
REVIVO CORE PASTE · CUPOLINOR · CUPOLINE · TACCONE MOLDING MACHINES

you can really
do sand tricks
with plasti-bond
. . . yet (like the props in any trick) it's not hard to handle. You can combine high strength and toughness with flowability.
You can get maximum flowability, superior finish and easy control *plus* high strengths for easy molding, tough sand for deep pockets, low moisture for minimum defects. Sound like magic? You can get properties in sand such as you never got B.P.B. (Before *Plasti-Bond*). Read on.
Plasti-Bond gives you sand flexibility and versatility that will speed foundry operations, cut costs, improve castings and boost profits.
Not even *Plasti-Bond* can do the impossible but it comes so close to doing it, your curiosity, if not your troublesome sand problems, may lead you to get more information.
FREE—Just write for new brochure
"Sand Magic with Plasti-Bond"
EASTERN CLAY PRODUCTS DEPT.
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
20 NORTH WACKER DRIVE • CHICAGO 6
Dixie Bond • Black Hills Bentonite • Revivo Bond • Plasti-Bond
Revivo Core Paste • Cupolinor • Cupoline • Taccone Molding Machines
MINERALS International CHEMICALS
SAND
MAGIC

USE-
MONORAIL
for
Modern Foundry Handling

It meets all requirements for space limitation. Uses overhead space under congested areas.

Versatile application. Hand or power operated carriers . . . many automatic features available.

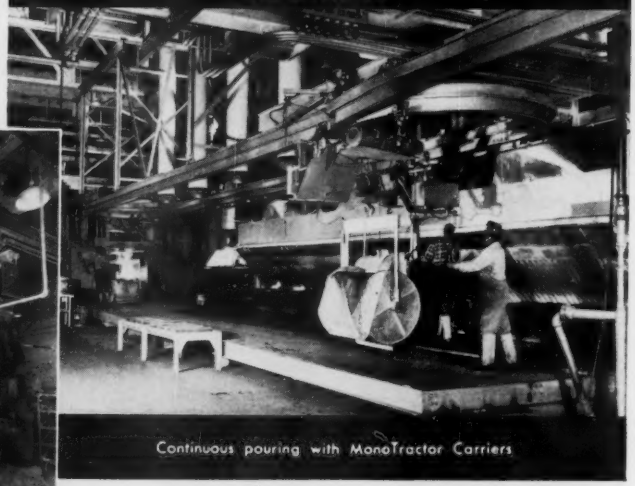
MonoRail is permanent, inexpensive and has extremely low maintenance costs.

SEND FOR BULLETIN C-1

or we'll be glad to have our representative call on you.

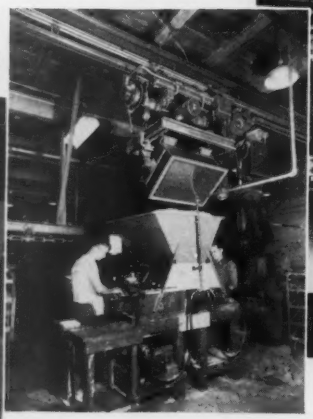
Free moving cranes cover large pouring floor

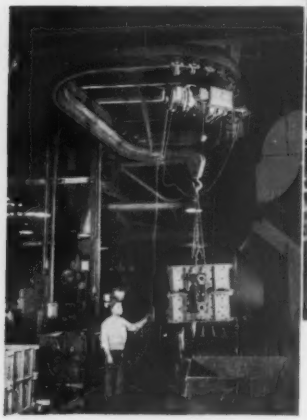
Hand pushed cranes serve mold preparation from conveyor loop



Continuous pouring with MonoTractor Carriers

Automatic dispatch delivery of fresh core sand





MonoTractor carrier serves shakeout from MonoRail loop

Member of Materials Handling Institute and Monorail Manufacturers Association

For Power Driven Conveyors, Use Landahl Chainless Conveyors

AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

(IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

SIPAC T.M. NON-CARBONACEOUS CORE COATING THAT PRODUCES SMOOTHER FINISHED CASTINGS

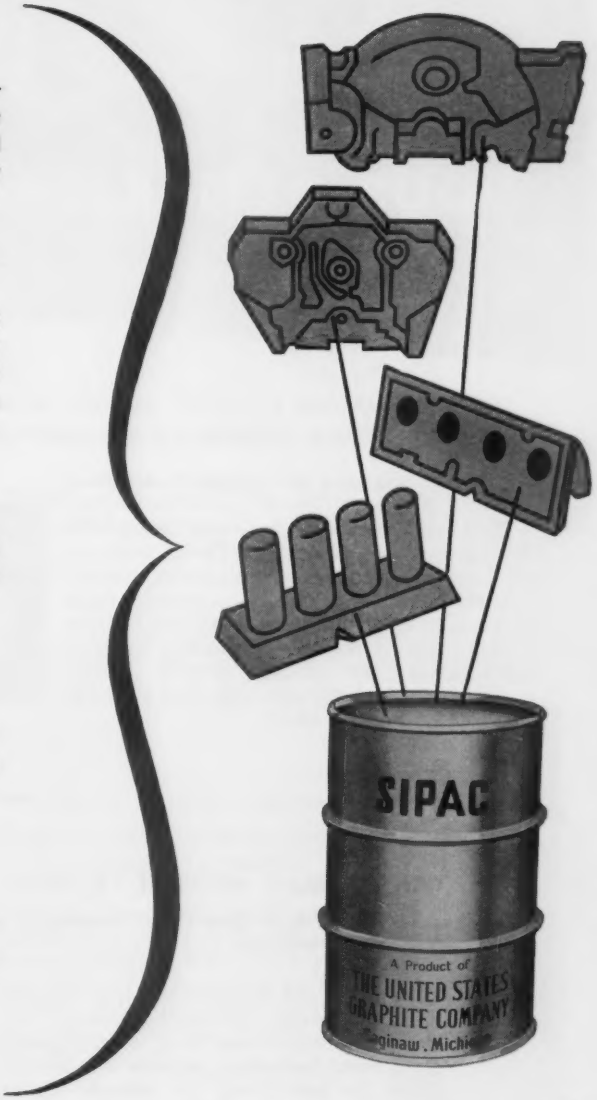
SIPAC United States Graphite Company's complete core coating, requires only the addition of water, and produces bright, gold-colored coating with fine, smooth surfaces—using any foundry sand.

SIPAC is non-carbonaceous and inert; will not react with any molten metal, including grey iron and steel. Clean to handle, its burnished gold color makes cores highly visible—a real help in placement of cores in the mold.

SIPAC costs less and gives improved casting quality. Resists flaking and completely seals core surfaces.

AVAILABLE in 55-gallon drums, (in paste form) ready for mixing and dilution to your desired Baume—even to a scale of 32—without settling.

WRITE TODAY for details about SIPAC or any other United States Graphite Company core and mold coatings.



228

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

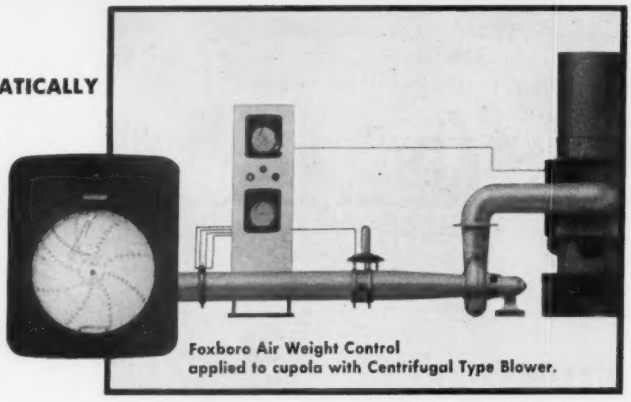
GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

POUR BETTER CASTINGS—AND SAVE

IMPROVE CUPOLA EFFICIENCY — AUTOMATICALLY

. . . with Foxboro Air Weight Controllers

Performance-proved in more than 1500 successful applications! These popular Foxboro Controllers automatically "weigh" air for cupola blast . . . provide right amount of oxygen for best combustion regardless of weather conditions. Results: higher quality castings, greater productivity . . . fuel savings and less pigging. Write for Bulletin 10-10.



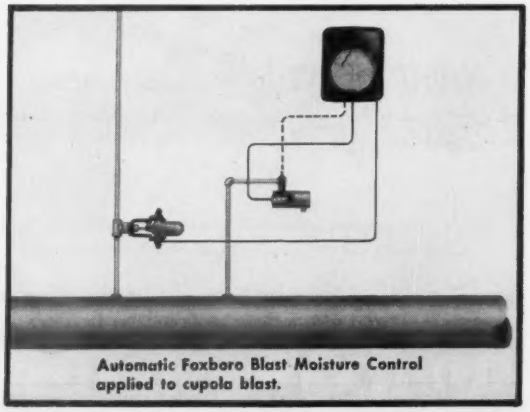
Foxboro Air Weight Control applied to cupola with Centrifugal Type Blower.

CONTROL BLAST MOISTURE — IT PAYS!

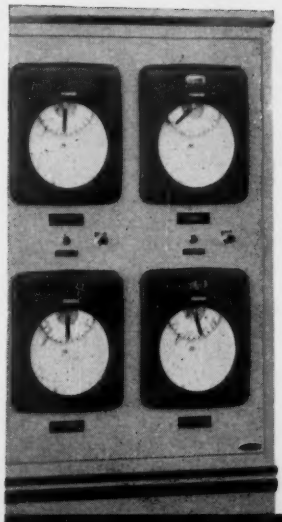
. . . with Foxboro Dew Point Recorders and Controllers

These Foxboro Instruments, with the exclusive Dewcel* measuring element, reduce coke waste and "cold metal" pours. Dew Point Recorders provide a foolproof basis for modifying the formula under varying humidity conditions. Dew Point Controllers automatically compensate for blast moisture variations on long-run heats. Write for Bulletin 11-11A and Data Sheet 330-1.

*Reg. U. S. Pat. Off.



Automatic Foxboro Blast Moisture Control applied to cupola blast.



FROM CUPOLA BLAST CONTROL to automatic foundry operation, Foxboro-engineered instruments and control systems yield cost savings . . . better castings . . . greater efficiency. Your nearby Foxboro Field Engineer will show you why — and how. Or write us for details on the instruments and control systems shown below. The Foxboro Company, 325 Neponset Ave., Foxboro, Mass., U.S.A.

Typical control panel, with complete instrumentation for hot blast cupola operation

. . . with Foxboro Complete Foundry Instrumentation

BAKE CORES MORE UNIFORMLY

. . . under Foxboro Core Oven Control

Here's automatic assurance of better, more uniform cores from both batch and continuous type ovens. A wide variety of electric and pneumatic Foxboro Temperature Controllers in recording as well as indicating models, is available for all types of heating systems and ovens. Write for Bulletin 5A-13A.

STOP CUPOLA TROUBLES BEFORE THEY START

. . . with Foxboro Windbox Pressure Recorders

These "trouble-shooting" recorders give operators a continuous record of cupola conditions . . . show up clogged tuyeres, bridging, fine coke sizes, etc. They're dependable, accurate, troublefree performers. Write for Bulletin 6-10B.

OTHER FOXBORO EFFICIENCY BOOSTERS

Blast Pressure Recorders
Automatic Temperature Controllers for Pre-Heaters
Pressure Controllers for Exhaust Systems
Temperature Protection for Fans and Dust Collectors
Temperature Controllers for Auxiliary Start-Up Heaters

"PIN-POINT" CONTROL OF MULTI-ZONE FURNACES

. . . with Foxboro Multi-Record, Multi-Point Temperature Controllers

Each instrument provides electric control of as many as 6 temperature points, recording them on a single round chart! This means top economy for zone type annealing ovens and heat treating furnaces. Write for Bulletin 20-10.

FOXBORO
Reg. U.S. Pat. Off.

COMPLETE FOUNDRY INSTRUMENTATION

for lower maintenance

it's ohio magnets

Ohio Magnets cost less to maintain because they're built with an extra margin of safety. So for extra magnet life, extra magnet value—always specify Ohio Magnets and Ohio Magnet Controllers. There's a type and size for every lifting job. Send for free copy of Bulletin 112, or consult the Yellow Pages for Ohio offices in principal cities. AA-1478

THE OHIO ELECTRIC MFG. CO.
5400 DUNHAM ROAD • MAPLE HEIGHTS
CLEVELAND, OHIO

Ohio Also Makes Separation Magnets • Nail Making Machines • Fractional Horsepower, Shell and Torque Motors

9 things to check if shells stick

You can profit most from the inherent advantages of shell molding—close tolerances, smooth surfaces and reduced labor costs, if you have the latest technical information on shell mold and core making techniques. Here's where General Electric's technical service and technical literature can help.

For example, G.E.'s *"59 Answers to Your Shell Molding Problems"* tells you nine things to look for when shells stick . . . and what to do about them. Here, too, you'll find answers to other shell molding problems you may have encountered.

And when it comes to shell molding resins, G.E. has a range of products, each designed to help you make better shell molds and cores for the job at hand. *G-E 12374*, fast curing resin for high speed production, minimizes warpage because of its "hot rigidity." *G-E 12368* is best for intricate patterns with deep draw and minimum draft. *G-E 12392* is a good general purpose resin. It has no tendency to peel; properties of build-up and release are good. *G-E 12316* shell bonding resin joins shell mold halves efficiently, and *G-E SM-55* silicone release agent gives quick, clean removal of shells from the pattern.

For a copy of "59 Answers . . .", or for other technical information, write General Electric Company, Section F-3, Chemical Materials Department, Pittsfield, Mass.

IF SHELLS STICK . . .

• Check pattern for undercuts or rough spots • Be sure new patterns are thoroughly conditioned • Polish and recondition abraded patterns • Use proper lubricant • Avoid excessive lubrication • Clean pattern thoroughly • Use slower curing resin • Check ejection pin platen level • Look for loose pattern pieces.

Progress Is Our Most Important Product

GENERAL ELECTRIC

"DAVENPORT" HANSBERG Standard

Shoots intricate Cores

Four sizes, capacities 4 to 88 lbs

CORE SHOOTERS

"Davenport" Hansberg Core Shooters work on an entirely different principle than coreblowers. With a "Davenport" shooter a fixed limited amount of compressed air is stored in a reservoir directly behind the sand and is released instantaneously through a large valve entirely surrounding the sand chamber. The expanding air propels a "shot" or compacted mass of sand instantaneously into the core box sufficient to fill up the core box and to give a very compact core. The density of the core is much greater than a blown core. As soon as the core box is filled the air strikes back at the sand left in the head, keeping it flowable, and then leaves through an exhaust valve.

Perfect for CO^2 Process —

Molding Sands, Sands for CO^2 Process, Shell-Molding Resin Sands, Resin Cereal Core Sands, Pelleted Pitch Core Sands, etc. which are either difficult or impossible to blow, can be handled by shooting.

Advanced Method of Making Cores.

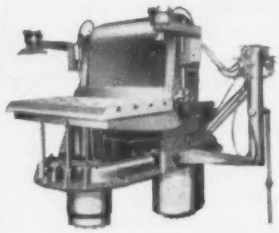
This patented method of shooting cores is the advanced method of making foundry cores more uniform, in less time — at a lower cost. Write or wire for more information pertaining to your individual requirements. Learn about the difference between Blowing and Shooting.

"DAVENPORT" STANDARD *Shooters* ®

The "Davenport" Hansberg Standard Shooter is made in 4 sizes with core capacities from 4 to 88 pounds. It is operated with a normal ¾" - 1¼" air line having 80 to 120 pounds pressure.

It has simplicity of design which provides the operator with a large visible air gauge and two convenient levers. One lever adjusts the height of the hydraulically operated table, or may be used as a hydraulic draw feature for the core box. The second lever feeds sand into the machine, operates the clamps and shoots the core.

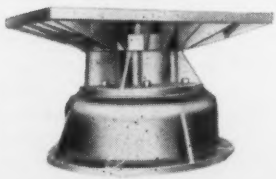
"Davenport"



ROLL OVER

This "Davenport" Jolt Roll Over draw molding machine is compact, sturdy and easy to operate. It is available in six sizes ranging from 1000 to 12,000 pounds capacities.

"DAVENPORT" PLAIN JOLT



"Davenport" plain jolt machines are made in eleven sizes with capacities from 200 to 25,000 pounds. Table sizes from 12" x 12" to 72" x 96".

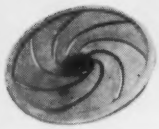
DAVENPORT MACHINE AND *Foundry Company*

Davenport, Iowa, U.S.A.

and Automatic *Shooters*®

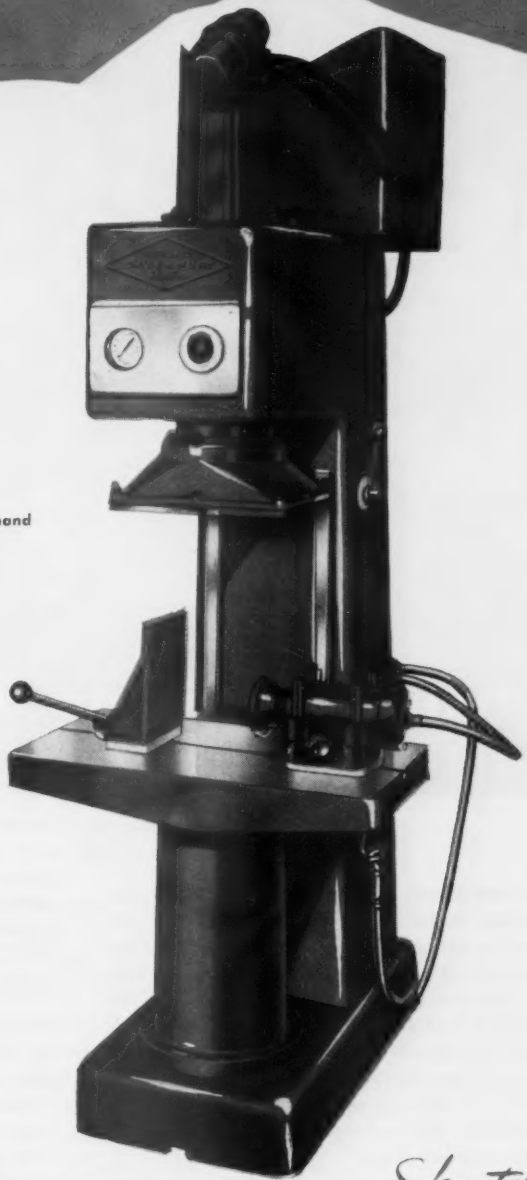
in less time at lower costs

Ideal for large and small runs.

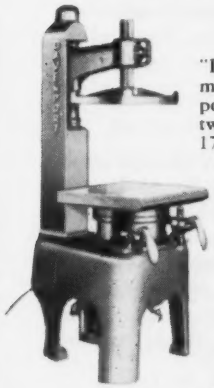


"DAVENPORT" Hansberg Core Shooters
Give You

- Better Cores
- Lower Costs
- Lower Air Consumption
- Faster Production
- Use of high strength sands with high moisture contents
- Use of wooden core boxes
- Virtually NO erosion of wood or metal core boxes
- Air-on-oil hydraulic finger tip controls on height of table eliminating slow hand operated spindles and wheels
- No vents necessary in open core boxes
- Minimum vents necessary in closed core boxes for release of only atmospheric air
- Rapid change of core boxes
- Removable side clamps permitting conveyor operation
- Ideal for mass or jobbing production
- Repairs and maintenance at a minimum
- Proven record of over 4000 in use in U.S.A. and Europe
- Manufactured in U.S.A. by a foundry equipment company with over 70 years reputation



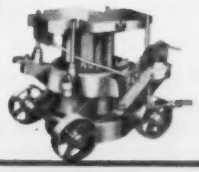
Molding Machines



JOLT SQUEEZE

"Davenport" Jolt Squeezers are made in both stationary and portable models and made in two sizes with table sizes from 17" x 20" to 20" x 29".

"DAVENPORT" PIN LIFT



"Davenport" Pin Lift machines are made in both stationary and portable models. Six sizes with capacities from 1000 to 12,000 pounds. Larger machines require foundation pits.

"DAVENPORT" AUTOMATIC *Shooters*®

The "Davenport" Hansberg Automatic Shooter is made in 4 sizes with core capacities from 4 to 88 pounds. It is operated with normal ¾" to 1¼" air line having 80 to 120 pounds pressure. It has simplicity of design which provides the operator with a large visible air gauge and one electric control button. At the touch of the button the machine clamps the core box and shoots the sand into the box, then unclamps. While the core is taken away the machine is automatically refilled with sand. For set-up purpose the machine can also be operated manually.

DAVENPORT MACHINE AND *Foundry Company*
Davenport, Iowa, U.S.A.

Circle 577 on Inquiry Card

Robert Shea, Crouse-Hinds' foundry engineer says, *"This type of shakeout operation could not be carried out without the services of the 'PAYLOADER' units. Due to the versatility and ruggedness of the 'PAYLOADER' tractor-shovels we were able to install molding systems which increased production 30% and substantially reduced risks of injuries from lifting and handling hot castings. We couldn't do our job without them."*

Crouse-Hinds Company, Syracuse, N.Y., is a foremost manufacturer of electrical equipment including conduit fittings, floodlights, airport lights and traffic signals. In its foundry, three model HA "PAYLOADER" tractor-shovels play an important part in an ingenious and efficient production line.

During the pouring operations, these versatile tractor-shovels stand by the end of the pouring-conveyor line. As fast as the jackets are removed, the molds are pushed from the conveyor into a "PAYLOADER" bucket and are carried and dumped on the shakeout. As the castings come off the end of the shakeout they drop into a waiting "PAYLOADER" bucket, as shown in the illustration, and are whisked away to the core-knockout room. These three model HA's also deliver sand from the mixer to the molding stations.

A variety of extra attachments are available to interchange quickly with its bucket and enable the model HA to do other useful jobs — tine bucket, lift fork, pick-up sweeper, castered scrap hoppers. A nearby Distributor is ready to demonstrate what a model HA or a larger "PAYLOADER" can do for you on *your* jobs.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

- ☐ Model HA (18 cu. ft.) and HAH (1 cu. yd.)
- ☐ Larger models up to 2¼ cu. yd.

Name _____

Title _____

Company _____

Street _____

City _____ State _____

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SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

IH

Circle 578 on Inquiry Card—Page 51

Late News

WOULD CRIPPLE BDSA: Elimination of the 25 Industry Divisions of the Business and Defense Services Administration is recommended by the House Appropriations Committee in cutting $3½ million from the Department of Commerce's budget request. If carried out, this move will wipe out a vital link in the defense production program.

Primary function of the Industry Divisions is to assist in channeling materials into defense work and to issue priorities and allocations to expedite military programs of high urgency. Last year they acted on more than 10,000 requests from defense contractors for special assistance in material procurement.

The agency's greatest potential value is in providing an experienced nucleus to handle industrial mobilization in any future emergency, thereby eliminating the delays and confusions which occurred in past crises. Currently the divisions also protect the civilian economy from unreasonable dislocations by military procurement, and they provide the only forum in government where the requirements and problems of industry can be discussed in a helpful atmosphere.

Industry leaders point out that to transfer the agency's responsibilities to some other group would require the same number of experienced people as are now in the BDSA divisions—with the same or higher cost to the government. (Industry personnel of the divisions serve without compensation.)

The Senate Appropriations Committee is expected to act on the House recommendation within the next two weeks. Meanwhile, those who believe that national security and industry will be harmed by this proposed crippling of BDSA are urged to so advise their senators.

COOLED OFF: Sharp decline in prices of ferrous scrap the last four months apparently has cooled the heat engendered by the Department of Commerce survey of effects of heavy exports (*Foundry*, March, p. 97). This study indicated that the reservoir of better quality scrap is being drained and that a sustained national emergency would result in a serious shortage. Commerce briefly suspended processing of export license applications but since resuming processing has made no announced progress toward limiting either quality or quantity of scrap permitted to be exported. First-quarter scrap export licenses covered 1,811,000 tons, 32 per cent more than a year ago. Heavy melting grades represented 68 per cent of January's shipments of nearly 500,000 tons. Domestic consumers maintain that the lower price level does not alter the need for Commerce to take some action.

BUYS BADGER MALLEABLE: Mueller Industries Inc., Aurora, Ill., has bought Badger Malleable & Mfg. Co., Milwaukee. Personnel of the latter will be unchanged. T. E. Ward, president and treasurer of Badger, will join the Mueller board. Mueller's other divisions are Love Bros. Inc. and Pyott Foundry & Machine Co., Aurora, Ill., Midwestern Foundries Inc., Garrett, Ind., and Sterling Casting Corp., Bluffton, Ind.

OBITUARY: William A. Kennedy, supervisor of products, Grinnell Corp., Providence, R. I., died April 8 . . . J. J. McLaughlin, general manager, Savannah Machine & Foundry Co., Savannah, Ga., died April 5 . . . J. F. Mooney, vice president and chief design engineer, Star Foundry & Machine Co., New Lexington, O., died April 6 . . . W. D. Mileham, Philadelphia pattern shop owner, died April 8.

NEW FOUNDRY: Graham-White Mfg. Co., Salem, Va., plans construction of a $200,000 foundry there for the production of automotive and diesel engine parts. The company's present operations at Princeton, W. Va., including a foundry, will be transferred to Salem.

WAGES RAISED: About 2000 foundry workers in Chicago, Aurora, Batavia, Geneva and Joliet, Ill., will receive pay increases of 10 cents an hour for molders and coremakers

and 5 cents an hour for semiskilled workers, effective May 1. Increases are part of a three-year contract negotiated a year ago between the Chicago Foundrymen's Association, which represents 29 foundries, and the union. New scale for molders and coremakers is $2.50 an hour, for semiskilled workers $1.85 to $2.40, with numerous fringe benefits also applying.

STANDOFF: Several leading industrial business barometers showed almost no change in the first quarter from levels a year ago. It was practically a standoff for production of steel, autos and coal. Electric power output was up, freight car loadings off.

PERSONALS: Arthur L. LaMasters, recently vice president, Alloy Engineering & Casting Co., Champaign, Ill., has been made vice president, Michigan Industries Co., subsidiary of Consolidated Foundries & Mfg. Corp., Chicago . . . William Ball, previously vice president, Taylor & Fenn Co., Windsor, Conn., has been elected president . . . Charles E. Drury, plant manager, Central Foundry Div., GMC, Danville, Ill., has been appointed a director of the American Foundrymen's Society to fill the unexpired term of R. V. Righter, recently transferred by General Motors from Danville to Detroit . . . Allen M. Slichter, president, Pelton Steel Casting Co., Milwaukee, has been appointed to a three-year term as an AFS director . . . Kenneth E. Blessing has been made sales manager, Wheelabrator Corp.'s Dust and Fume Control Div. . . . Clyde L. Pinkston has resigned as field director, Foundry Educational Foundation, to join Lincoln Equipment Co., Milwaukee.

MISCELLANY: Erie Engine & Mfg. Co., Erie, Pa., is selling all of the equipment of its gray iron foundry, which has been idle for some time, to provide additional space for other manufacturing operations . . . Vesuvius Crucible Co., Swissvale, Pa., will spend $125,000 this year to expand manufacturing facilities . . . Virginia Metalcrafters Inc., Waynesboro, Va., has acquired control of Riteway Mfg. Co., Harrisonburg, Va. . . . Barclay Foundry Inc. has started production at its new $100,000 plant at 4239 W. Lincoln Ave., Milwaukee . . . Steel production averaged 350,966 tons daily in the first quarter, against 350,242 tons in the 1956 period, according to the American Iron and Steel Institute.

Prices of Foundry Metals and Coke

(As of April 19, 1957)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.50-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$67.00	$67.50
Birmingham	59.00	63.00
Buffalo	65.00	65.50
Chicago	65.00	65.00
Cleveland	65.00	65.00
Duluth	65.00	65.00
Erie, Pa.	65.00	65.00
Everett, Mass.	66.50	67.00
Fontana, Calif.	73.00	....
Geneva, Utah	65.00	....
Granite City, Ill.	66.90	67.40
Neville Island (Pittsburgh)	65.00	65.00
Swedeland, Pa.	67.00	67.50
Toledo, O.	65.00	65.00
Troy, N. Y.	67.00	67.50
Youngstown, O.	....	65.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 31.50; tin bronze, No. 225, 40.50; No. 245, 35.50; high-leaded tin bronze, No. 305, 35.50; No. 1 yellow, No. 405, 25.25; manganese bronze, No. 421, 28.50.

ALUMINUM: 99 per cent plus primary ingots 27.10. Secondary No. 12 alloy 21.50-22.50. Deoxidizing grades: No. 1, 23.25; No. 4, 19.75.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 32.00, delivered Connecticut valley.

ZINC: High grade 14.85 delivered. Die casting alloy No. 3, 17.50; No. 2, 18.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No.1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$40.00–41.00	**$48.00–49.00	.....	.....	.....	.....	**$53.00–54.00
Boston*	**36.50–37.00	**38.00–39.00	.....	.....	**44.00–45.00	.....	.....
Buffalo	41.00–42.00	**41.00–42.00	.....	.....	**46.00–47.00	.....	59.00–60.00
Chicago	41.00–42.00	39.00–40.00	.....	44.00–45.00	44.00–45.00	53.00–54.00	56.00–58.00
Cincinnati*	**37.00–38.00	**44.00–45.00	**43.00–44.00	.....	**55.00–56.00	.....	**64.00–65.00
Cleveland	38.00–39.00	48.00–49.00	37.00–38.00	47.00–48.00	50.00–51.00	53.00–54.00	66.00–68.00
Detroit*	**34.00–35.00	**46.00	**39.00	**51.00	.....	**53.00	.....
Los Angeles	55.00	**60.00	.....	.....	.....	.....	.....
New York*	42.00–43.00	41.00–42.00	45.00–46.00	.....	.....	.....	.....
Philadelphia	46.00	43.00–44.00	54.00–55.00	.....	55.00–56.00	62.00	65.00–66.00
Pittsburgh	41.00–42.00	44.00–45.00	42.00–43.00	.....	51.00–52.00	.....	66.00–68.00
St. Louis*	39.50	43.00	35.00	48.00	.....	.....	59.00
San Francisco	51.00	57.00	42.00	57.00	57.00	.....	.....
Seattle	48.00	50.00	48.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

For Cleaner Surfaces, Better Shakeout, Try WHITEHEAD'S NEW HYGEIA LYQUAFLOUR

Our new plant at Irwin, Pa., is producing the improved DUSTLESS DOUBLE STRENGTH HYGEIA LYQUAFLOUR. This compound of a special hydrocarbon and woodflour improves castings and mold conditions for all types of metal. Highly recommended for the advantages listed below:

- One sand additive controls both peel and expansion
- Good shakeout saves sand
- Imparts highest flowability to sand mixture to give pattern true finish
- 2% initial treatment of sand and as little as ¼ of 1% to reactivate does the job
- Replaces any carbon or hydrocarbon materials now used
- Eliminates dust at the muller
- Castings peel excellently which reduces cleaning room time
- Reduces penetration and burn-on
- Overcomes sand expansion defects, maintains good compression strength
- Improves molding, "feel", and "moldability"
- No rigid control required
- Permits hard ramming
- Less ramming required, more molds per hour
- Less temper water needed

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of

LYQUAGRIP
Ready-to-use core paste

DUO RESIN
Binder for baking with controlled oven temperatures

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

Circle 579 on Inquiry Card—Page 51

The world's finest alloys are melted in Ajax induction furnaces

Induction heating melting

AJAX

NORTHRUP

Mixing metals can present some awesome complications.

Dispersing lightweight aluminum through a nickel-cobalt solution, for example. Or recovering every grain of gold from a minting operation. Or salvaging the valuable chromium trapped in stainless steel scrap.

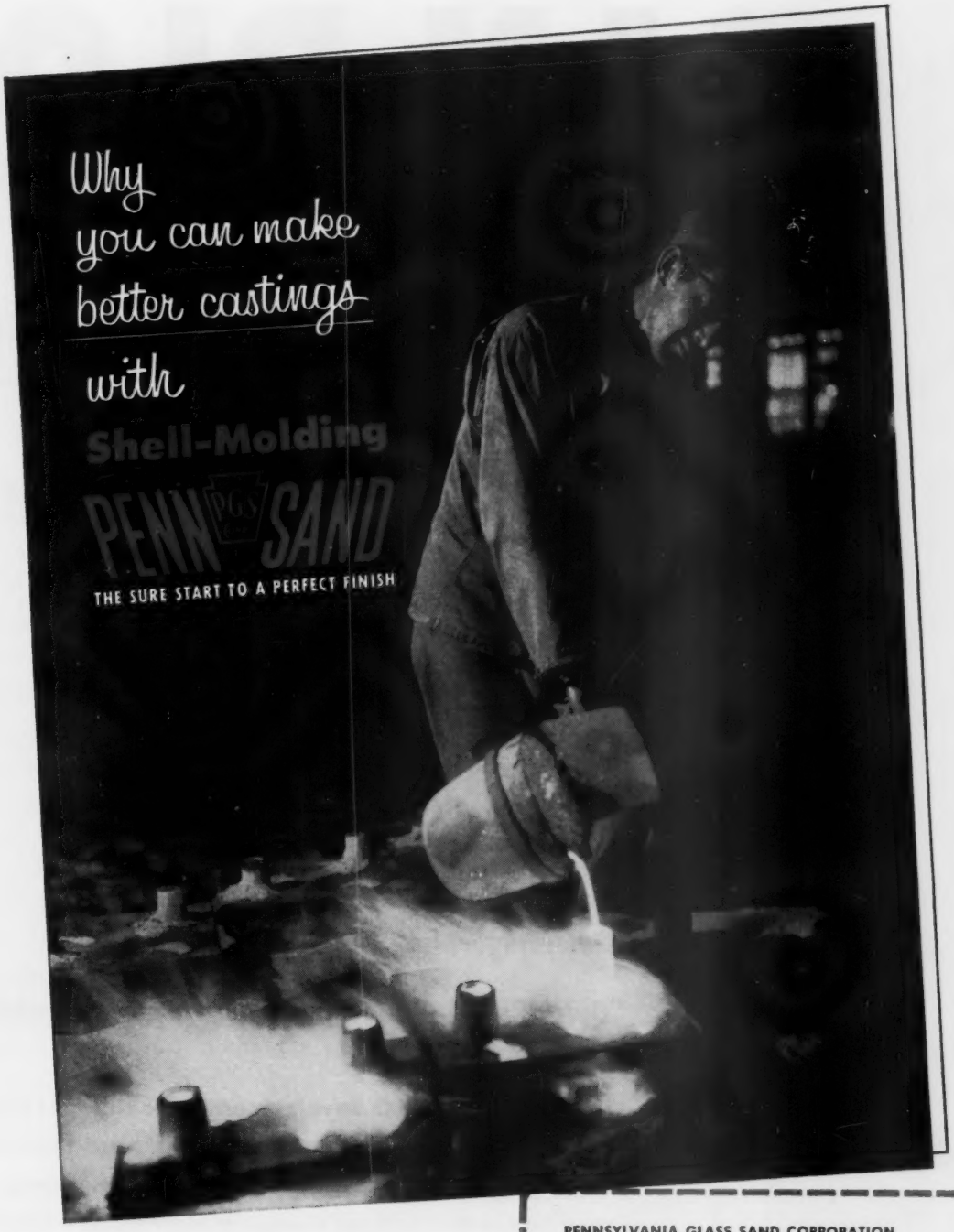
Surprisingly enough, all three of these problems are related. For they share a common solution . . . the unique features of an Ajax-Northrup induction furnace. This furnace "stirs" its molten charge, dispersing every element evenly through the melt regardless of density . . . combines fast melting with extremely accurate temperature control . . . prevents contamination . . . makes 100% scrap recovery an everyday reality.

That's why so many important alloys owe their very existence to Ajax induction furnaces. That's why, whether the charge is a new super alloy . . . bronze . . . or even gold . . . if the results are important, the furnace is Ajax-Northrup.

The fascinating history of induction heating and its unique application to melting, forging, and heating operations throughout industry are told in a new book. Write Ajax Electrothermic Corporation, Trenton 5, New Jersey for your copy.

Precision alloying is just one of the many processes which owe their existence to Ajax-Northrup induction heating.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY—AJAX ENGINEERING CORPORATION



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TWO GATEWAY CENTER, PITTSBURGH, PA.

Please send me, without obligation, a copy of your new illustrated brochure, "Why You Can Make Better Castings With Shell-Molding PENN-SAND."

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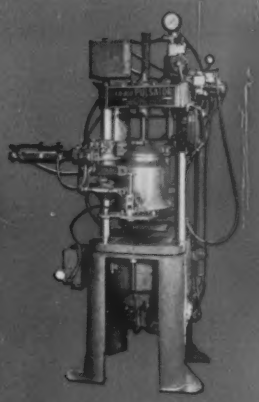
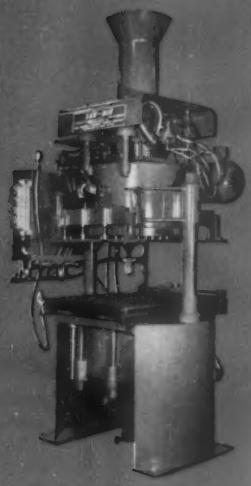
SAN-BLO®

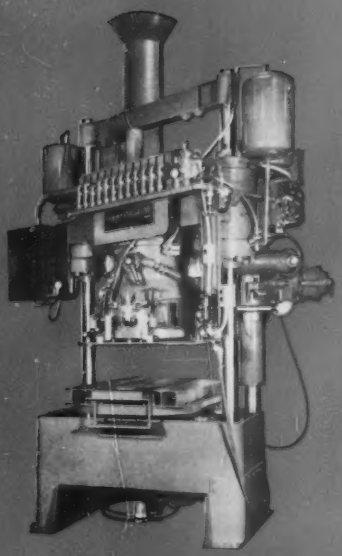
dedicated to



for cores weighing
up to 40 lbs. each



for cores weighing
up to 150 lbs. each



for cores weighing
up to 250 lbs. each

SAN-BLO . . . first with these advancements . . .

- ☆ ***Motor-driven agitator!***
- ☆ ***"Aerating" air circuit!***
- ☆ ***Single, automatic control!***
- ☆ ***Automatic, electric, blow-cycle timing!***
- ☆ ***"LPP" (low pressure prefill)!***
- ☆ ***"Pulsating" blow action!***
- ☆ ***"Quick-Change" blow and vent plate assembly!***

The above SAN-BLO developments, for the first time, provided for the blowing of *any* core sand mixture, in *either* wooden or metal core boxes, with *minimum* core box wear, *without* changing blow head and with *minimum* time changing core boxes—and provided for blowing *all* cores with *equal efficiency*, whether large or small, simple or complex, of heavy or light sand. No other core making machine has contributed so much, for the advancement of automatic core production!

Manufactured by *San-Blo Division*

advancement in core production!

SAN-BLO introduced the first "mechanized" sand chamber, or blow head, with motor-driven agitator and "aerating" air circuit, to eliminate "flowability" as a critical factor in the preparation of core sand mixtures. These exclusive features permit the use of the same sand chamber for producing both small and large cores, eliminate "piping" and permit the proper location of blow holes in the blow plate, to minimize horizontal sand travel in the core box.

SAN-BLO pioneered automatic core blowing to speed up and standardize the rate of core production, utilizing electronic devices to provide single-push-button control and electric timing of the blow cycle. Automatic, electric controls make obsolete the manual-control operation of core machines.

SAN-BLO perfected "LPP" (low pressure prefill) to minimize core box wear and subsequent repairs. It developed "Pulsating" blow action to permit the safe blowing of wooden core boxes without the need for special, protective rigging. These two remarkable techniques, plus the "mechanized" blow head, make possible the full utilization of compressed air as a "lubricant" for the movement of sand from blow head to core box. They first provide for the filling of the core box with sand propelled by only a few pounds air pressure (LPP), followed immediately by the introduction of sand under pulsating, full line pressure, to pack the sand to proper hardness. No other "blow" or "shoot" can match this method of core making, in providing both core box protection and correct packing of the sand.

Another SAN-BLO development was the "Quick-Change Blow and Vent Plate Assembly" for open-top core boxes. This modern device provides for changing from job to job in a matter of seconds. No longer is it necessary to stop production to change blow head and blow plate, when changing boxes. No longer is it necessary to invest hundreds of dollars in a number of different size blow heads — when simple, inexpensive blow sheets will do the same job.

Foundrymen, both jobbing and production, who realize that the full utilization of modern, automatic machines is the only answer to core production problems, will turn to machines incorporating modern design. These foundrymen, therefore, are invited to investigate the SAN-BLO . . . tomorrow's core blower, ready to do a better job of making cores, today!

MEMBER FEMA

The FEDERAL FOUNDRY SUPPLY Company 4600 EAST 71st STREET · CLEVELAND 5, OHIO

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up to 250 lbs. each

MAGNAFLUX

Offers You THE BROADEST LINE of NONDESTRUCTIVE TESTING EQUIPMENT—Starts as Low as $36.00

MAGNAFLUX' METHODS are used by more industries, for more inspection operations, than all other methods combined!

Through Magnaflux Corporation, you have available the broadest range of nondestructive test equipment and materials. From dye penetrant inspection, through every type of magnetic particle and fluorescent penetrant inspection as well as ultrasonic and eddy current inspection methods, you can select the type to meet your needs, exactly.

ONLY PROVEN SERVICE COULD BUILD SUCH SUCCESS!
Write now for more complete information.

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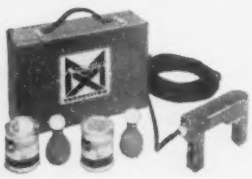
SPOTCHECK...

Just Spray it On to Find Cracks

The improved dye penetrant inspection with all materials in pressurized cans . . . A COMPLETE PORTABLE KIT FOR ONLY **$36.00.** (Includes $1.00 for prepaid parcel post—U.S.A. only, local or use tax extra.)

THE MAGNAFLUX Y-5 YOKE KIT



Permits inspection with Magnaflux for surface cracks of all types—quickly and with positive indications. Completely portable; operates from any 115 V. AC outlet, or from a 12-volt car battery. Ideal for off-the-road equipment, or for inspection difficult by other methods.

Note: A similar Kit, the Y-M 5 is also available. It contains Alnico permanent magnets, and requires no power source.

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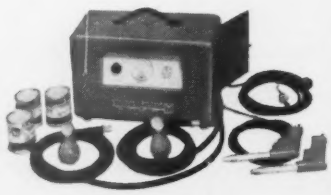
Eddy Current Electronic Instruments

A broad line of instruments for measuring conductivity, material, hardness . . . evaluating alloy or material—all at production speeds where required.

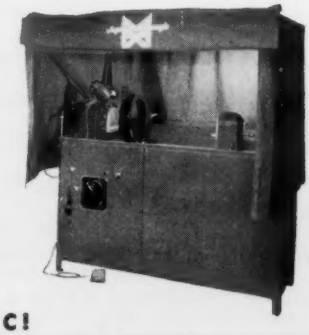
MAGNAFLUX K-05 UNIT



Portable Magnaflux Kit, 500 ampere output, operates from 110 V. AC. May be used to hand inspect large or small magnetic parts, regardless of shape. Axles, spindles, and machine parts may be inspected without disassembly. Utilizes either Magnaglo or Magnaflux powders. Weighs less than 40 lbs., with cables.

MAGNAFLUX DRC-543 UNIT

Especially designed for low-cost and effective production inspection of parts and tools in high volume. Handles parts up to 54" long. Magnaglo hood permits use of the fastest wet alternating current method. Has motor driven 30-point demagnetizing switch and foot control for contact heads.



. . . . AND MANY OTHERS—ULTRASONIC—ETC!

Other Inspection Methods and Equipment, Portable or Fixed, Cover Practically Every Field for Nondestructive Testing . . . Ceramics, Plastics, Stress Analysis and All Preventive Maintenance Inspection. WRITE FOR MORE INFORMATION RELATING TO YOUR PROBLEM OR ASK TO HAVE A MAGNAFLUX ENGINEER SIT IN WITH YOU!

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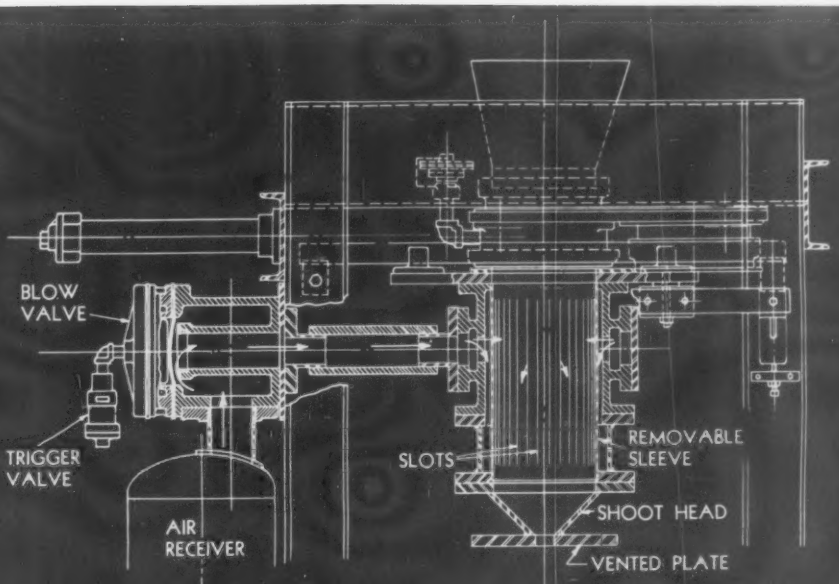
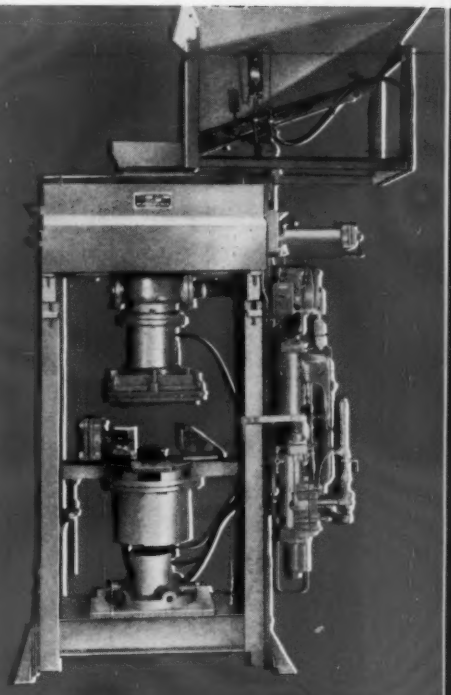




AVAILABLE SINCE 1952

#101-EO DEMMLER CORE BLOWING MACHINE

This machine may be used for shooting cores by substituting a shoot head for the standard blow plate.

Best quality cores are often produced by the time tested blowing method, and when it is preferred to use the machine as a blower the change can be made quickly and conveniently.

These are the same type machines as the successful Demmler mold blowers which have been breaking molding records for the past three years.

Yes, you can have a machine that gives you complete flexibility, to blow or shoot as you choose. Write us for complete data on this Demmler 101-E machine.

DEMMLER

FIRST NAME IN CORE BLOWERS

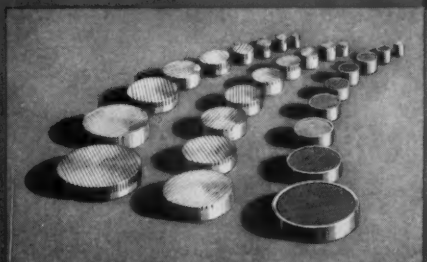
ONE MACHINE DOES BOTH .....BLOWS OR SHOOTS CORES

PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

NEW HL 150 Mesh Vents

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.



DEMMLER MANUFACTURING CO.

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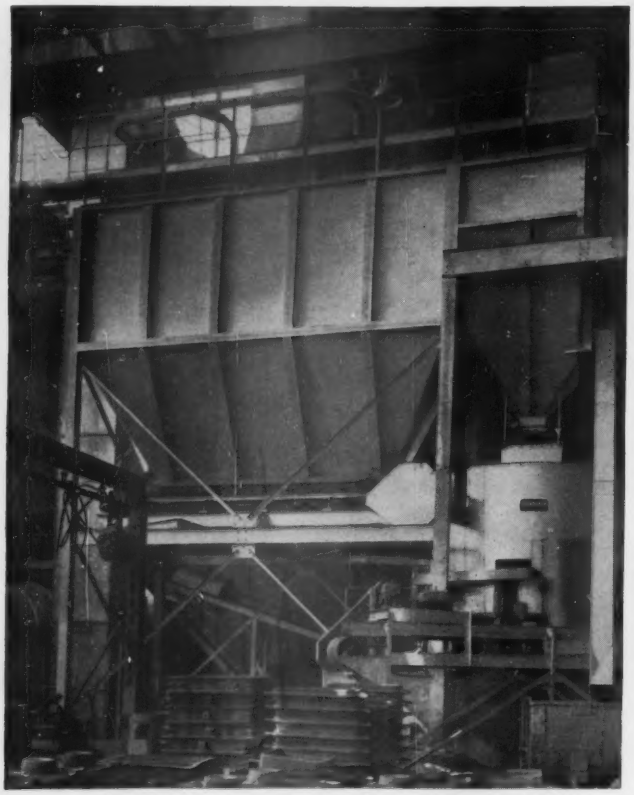
high quality castings need high quality foundry sand . . .



A Clearfield 930 Mixer is the heart of the sand conditioning system in a gray iron foundry.

and

that

calls for a

Clearfield Mixer

A Clearfield Mixer will consistently give you the quantity of sand when you need it, where you need it and with the desired qualities for your particular application. Clearfield Mixers are available in many sizes, to meet every requirement . . . as single units or as part of a sand processing system.

CLEARFIELD MIXER

the choice of industrial leaders

Write today for Catalog No. 83. Get the full information on the tested efficiency of all Clearfield Mixers.

CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.

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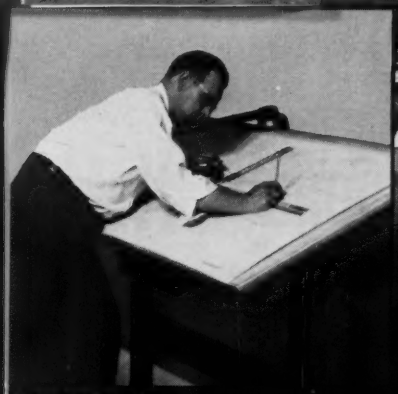

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Engineering specialists are available to assist with pattern design and development.

WOOD PATTERN SHOP

Skilled craftsmen, modern woodworking tools combine to produce accurate masters.

FOUNDRY

The latest electric furnaces, controls and methods insure the very finest pattern castings.

A *Complete* SERVICE...

METAL PATTERN SHOP

Experienced metalworking personnel carefully pilot patterns through each operation.

MACHINE SHOP

An efficient machine shop provides complete facilities for all pattern machining needs.

LABORATORY

Laboratory "in process" control and inspection insure consistent quality standards.

...FROM BLUEPRINT TO PRODUCTION PATTERN

That's right! City Pattern Foundry and Machine Company is equipped with the modern, efficient machinery and staffed with the skilled, experienced personnel to offer you a complete, "start to finish" service on *all* your pattern requirements. Now, obviously, from the standpoint of convenience alone, it pays to have all phases of your pattern development and production under one roof. But convenience, though important, is actually just a "fringe benefit" of City Pattern Foundry and Machine Company service. More important . . . and the reason why so many leading manufacturers rely on our pattern making facilities and knowledge . . . is the fact that our entire operation is geared to combine uncompromising accuracy with maximum efficiency. The result . . . over a period of more than 40 years . . . has been patterns of the finest possible quality at the lowest possible cost.

And that's not all! We're well equipped to serve you in a number of other ways, too. Our foundry department, for example, is one of the most modern and versatile in this section of the country for experimental or production castings, for high conductivity copper, copper alloy, brass and aluminum castings. What's more, City Pattern Foundry and Machine Company offers you complete facilities for fast, accurate, economical machining and fabricating. Want detailed information? Write or call today.

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FAST INDIRECT ARC MELTING, ROCKING ACTION PRODUCE CLOSE QUALITY CONTROL AT LOW OPERATING COST

Detroit Electric Furnaces offer three basic advantages for metal melting: Indirect arc heat for uniform high quality; controlled rocking action for maximum heat utilization and homogeneous alloy mixture; and quick shell interchange for economical melting of different alloys.

Close Control of Analysis

By using an indirect arc in a sealed chamber, Detroit Electric Furnaces produce alloys of consistent analysis through heat after heat. Electrodes remain clear of the molten bath at all times. The sealed chamber holds gaseous contamination to a minimum. Melting is rapid, yet final pouring temperature can be duplicated or varied at will.

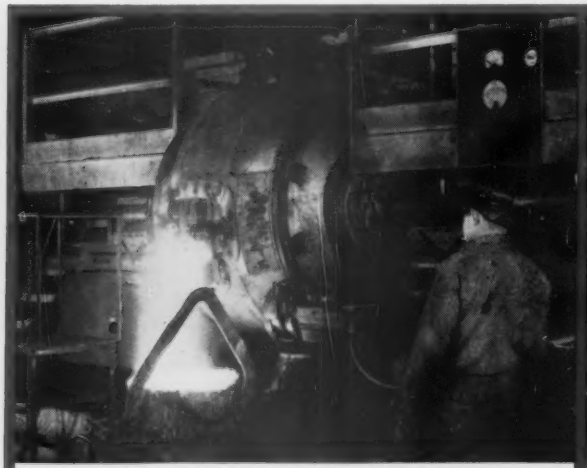
Double Economy with Rocking Action

Automatic rocking action washes the metal over a greater surface of the lining. This provides fast, efficient metal melting and stirs the bath constantly to assure homogeneity of the metal. Rocking action prolongs lining life by preventing excessive refractory temperatures. The optimum melting cycle for any particular heat can be determined then preset with the rocking controller.

Vary Production Schedules, Melt Different Alloys Easily

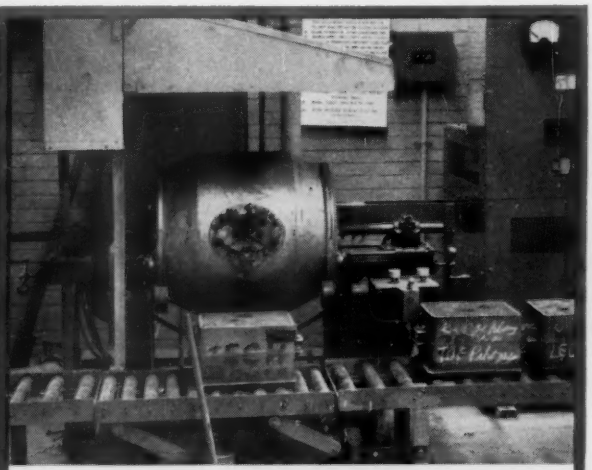
Detroit Electric Furnaces are designed to meet diversified melting requirements as well as long run schedules. Using the size furnaces suited to your production volume, a wide range of ferrous and nonferrous alloys can be handled with quickly interchangeable shells. This greatly lowers your initial investment.

Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your needs. Write today, or mail the coupon on the opposite page for full catalog information.



Type AA—1500 lbs. capacity

Produces 5-8 tons of metal per 8-hour shift. Pedestal-mounted electrodes with automatic arc control. Conical or cylindrical shell. 250 k.w. (brass) or 400 k.w. (iron) transformer.



Types GMS/GMT—60/100 lbs. capacity

Ideal for research and limited production. Type GMS-30 k.w. produces 800 lbs. per shift. Type GMT-50 k.w. produces up to 1200 lbs. Base-mounted electrodes. Single transformer and meter cabinet.

DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company

Bay City, Michigan

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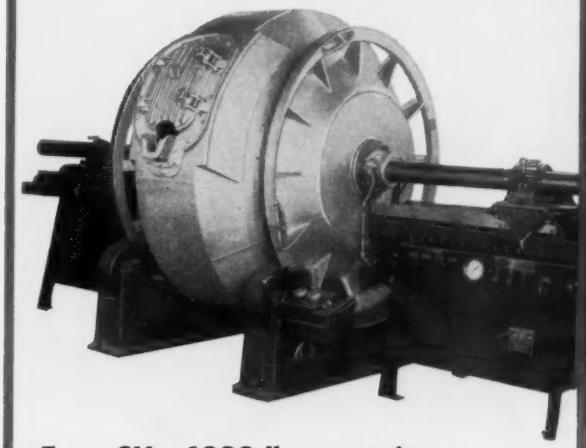
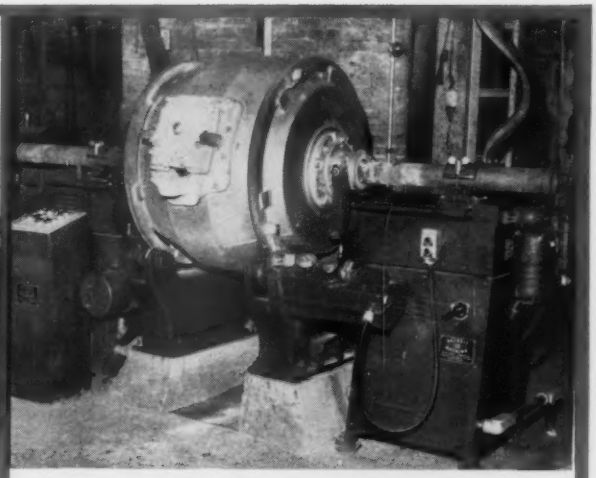
Melt with Detroit ROCKING Electric Furnaces



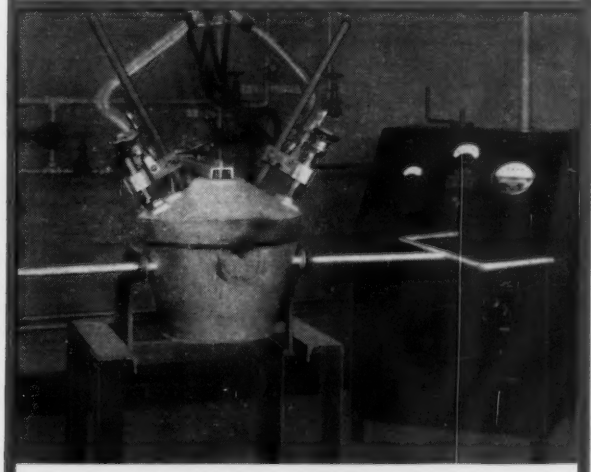
Type CM—4000 lbs. capacity

Produces 10-16 tons of metal per day. Pedestal-mounted electrodes. Conical or cylindrical shell. 400 k.w. (brass), 600 k.w. or 750 k.w. (iron) transformers. Also available: Type CC, 3000 lbs. capacity, rated at 350 k.w. or 600 k.w.



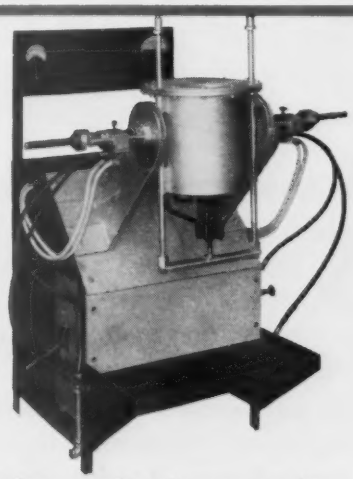
Type LFNP—500 lbs. capacity

For 2-4 tons of metal per shift. Pedestal-mounted electrodes. Conical shell. 150 k.w. transformer. Also available: Type LF-100 k.w., 200 lbs; Type LFC-125 k.w., 350 lbs; Type LFY-175 k.w., 700 lbs.



Type PT—15 lbs. capacity

Pot-tilting type for research and small production. Electrodes mounted in cover. Pot doubles as crucible. Single power unit has 12 k.w. transformer.



Type IC/ID—10/20 lbs. capacity

Investment casting type for precision castings. Type IC rated at 12 k.w., Type ID at 20 k.w. Furnace inverts to pour into attached mold.

FREE CATALOG

Detach and mail coupon for full information on Detroit Electric Furnaces.

Detroit Electric Furnace Division
Kuhlman Electric Company
Bay City, Michigan

Please send me a copy of your catalog No. 559 plus specific information on the Detroit Electric Furnaces checked at right.

Name_____ Title_____

Company_____

City_____ Zone_____

State_____

- ☐ AA
- ☐ CM
- ☐ LFY
- ☐ GMS
- ☐ PT
- ☐ IC

SHELL MOLDERS

Get quick, easy release everytime

More good shells, fewer "stickers" with Dow Corning 8 Emulsion

8 REASONS WHY LEADING SHELL MOLDERS PREFER **DOW CORNING 8 EMULSION**

• quick, easy release • easy to apply—faster wetting action • economical in extremely low concentrations • resists creaming or separation • minimum build-up—closer tolerance shells • stepped-up production — maximum number of shells between pattern cleanings • nonflammable • fast delivery from centrally located warehouses.

For clean, easy release of even the most complex sand-resin shells . . . you can't find a more reliable parting agent than Dow Corning 8 Emulsion.

Remarkably resistant to both oxidation and heat, Dow Corning 8 prevents sticking by forming an efficient silicone parting film that won't oxidize or decompose. Used with manual or automatic equipment, it helps produce a greater number of close tolerance shells per hour.

Don't let "stickers" handicap your production; use Dow Corning 8 Emulsion and get new, optimum performance at minimum cost.

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Dow Corning CORPORATION
MIDLAND, MICHIGAN

For the finest in Mechanization

Jeffrey's **UNIVERSAL MOLD CONVEYOR** is Flexible

Molds move on the level, up, down and around on the Jeffrey Universal Mold Conveyor . . . full operations at elevations to best suit each job. It's working in a dozen foundries around the country, helping to boost their earnings.

Operation is smooth; internal takeup on each car compensates for track irregularities. Power consumption is low; equipped with sealed-for-life ball bearings and oil-impregnated bushings.

All moving parts are shielded, giving full protection against sand, shot and runout. Rugged construction gives strength to spare for the toughest jobs.

Jeffrey engineers will study your needs, prepare layouts and recommend equipment, build and install a system. Catalog 845 describes these services. The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

MECHANIZE with Jeffrey machinery and save. Your materials-handling and power transmission equipment will give more efficient, economical operation if you employ time-tested, dependable Jeffrey products.

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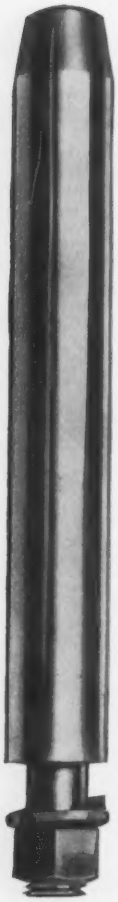
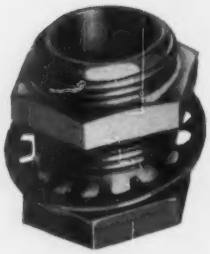


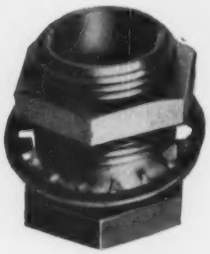
Adams Round Pin
Hardened, Ground
Hard Chrome Plated

Adams
Round Bushing
(End View)
Open

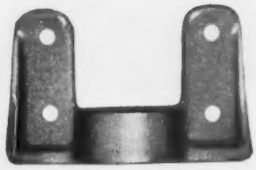
Adams
Elongated Bushing
(End View)
Hexagon Pin Inserted

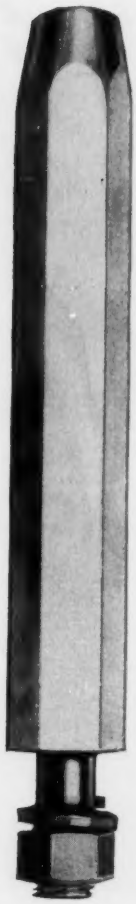


Adams
Round Bushing
Nut and Lock Washer
Long Flask
Short Plate



Adams
Elongated Bushing
Nut and Lock Washer
Long Flask
Short Plate

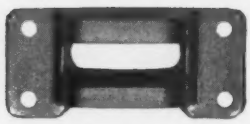




Adams Hexagon Pin
Hardened, Ground,
Hard Chrome Plated

Adams Pins and Bushings for Cherry and Aluminum Flasks assure you top quality and precision for close tolerance operation.

Proper mountings for pins and bushings for all Cherry Flasks are offered to meet practically all of your requirements.



Adams Pin and Bushing Mountings
(Cast Aluminum)
For Cherry Flasks
For Small Flasks—(Standard)

For New Equipment or as Part Replacement, the same care and accuracy in manufacture helps make the toughest jobs productive.

A wide variety of pin arrangements is included to complete our line. Write us at once for full information.

LET ADAMS HELP YOU ANALYZE YOUR FLASK EQUIPMENT PROBLEMS

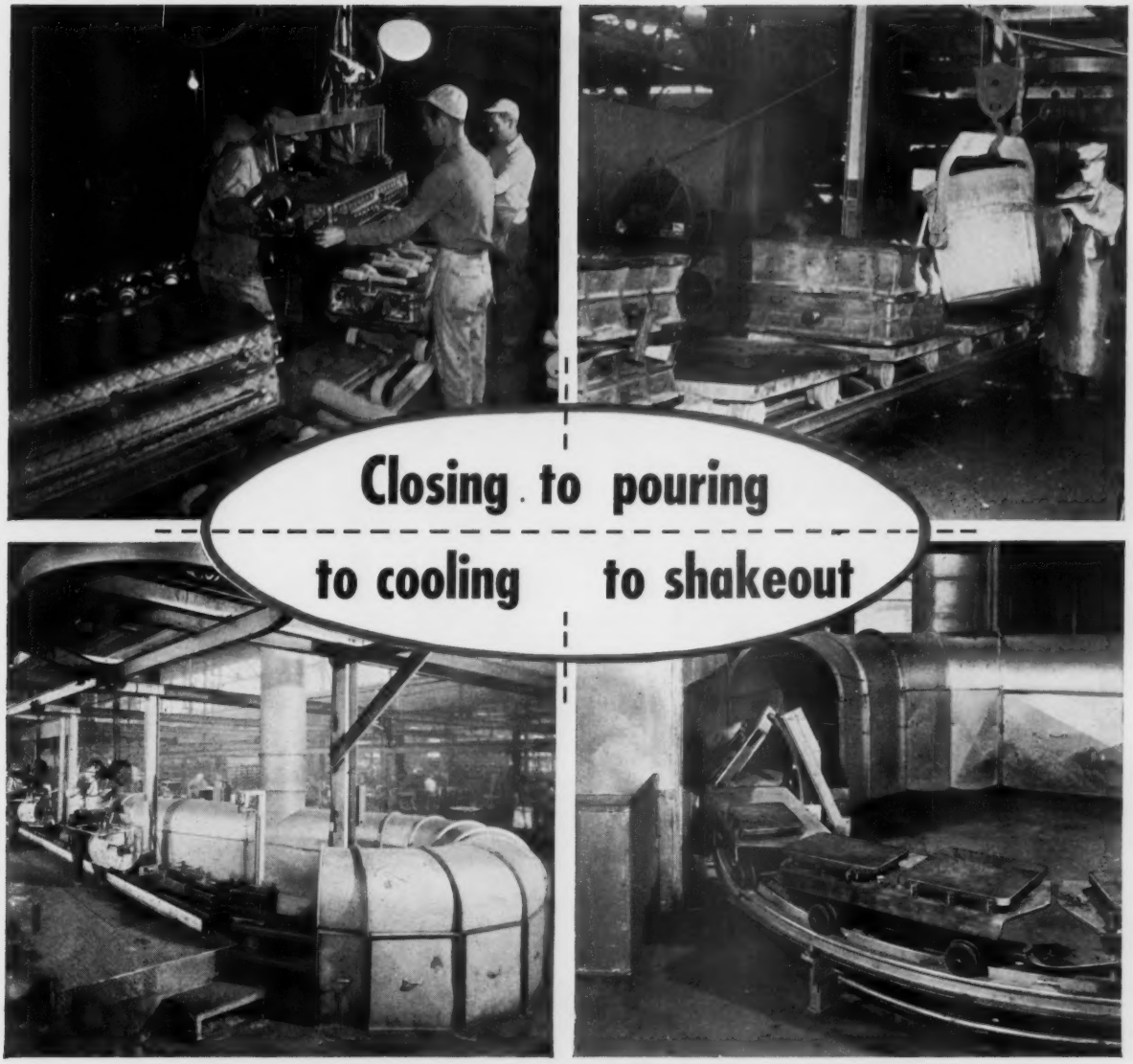
The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 590 on Inquiry Card—Page 51



NON-STOP

with the efficiency and economies of a LINK-BELT Tru-Trac Mold Conveyor

IF pouring in your foundry is continuous, no other mold handling method can match the economies Link-Belt Tru-Trac offers you. It simplifies the mold handling operation by eliminating unnecessary steps in transferring the molds from molding machines to conveyor. Pouring and shakeout are centralized for greater efficiency. And all along the line, Tru-Trac conserves floor space . . . permits straight-line movement of molds through molding, closing, pouring, cooling and shakeout operations. Working conditions, too, are improved by cooling hoods that confine smoke and gases.

As part of its complete line of foundry equipment, Link-Belt makes conveyors for handling molds ranging in size from automotive engine valve lifters to bath tubs. For expert engineering in foundry mechanization, call your nearest Link-Belt office. Or you can get full information by writing directly for Book 2423.

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

14,396

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

HY-TEN QUIK-SETT

The newest of all cold setting core binders—now available from HOUGHTON

All you need for the best and quickest cores you've ever made: Dry sand, free of clay; QUIK-SETT, and QUIK-SETT ACCELERATOR.

Treated sand can go right into core boxes. Pack it in by hand. Don't worry about dimensions. QUIK-SETT takes and holds the core box shape. Baking has no effect whatever on dimensions. Minimum reinforcing needed.

Baking takes just half the normal time.

QUIK-SETT cores are strong. They stand up well to the shock of molten metal, yet shake out quick and clean. The finish they leave is smoother and better than ever before possible with sand cores. Get full information by calling your Houghton Man —or write E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pa.

HY-TEN
QUIK-SETT...

products of...

E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service...

Circle 592 on Inquiry Card—Page 51

Reader Information Service

FOUNDRY

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FURTHER INFORMATION on Advertised Products ?

May 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626
522	537	552	567	582	597	612	627
523	538	553	568	583	598	613	628
524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
532	547	562	577	592	607	622	637
533	548	563	578	593	608	623	638
534	549	564	579	594	609	624	639
535	550	565	580	595	610	625	640
641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
648	663	678	693	708	723	738	753
649	664	679	694	709	724	739	754
650	665	680	695	710	725	740	755
651	666	681	696	711	726	741	756
652	667	682	697	712	727	742	757
653	668	683	698	713	728	743	758
654	669	684	699	714	729	744	759
655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
775	790	805	820	835	850	865	880

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May 1957

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641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
648	663	678	693	708	723	738	753
649	664	679	694	709	724	739	754
650	665	680	695	710	725	740	755
651	666	681	696	711	726	741	756
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655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
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CITY ..... ZONE.....

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FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
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FOUNDRY
Penton Building
Cleveland 13, Ohio

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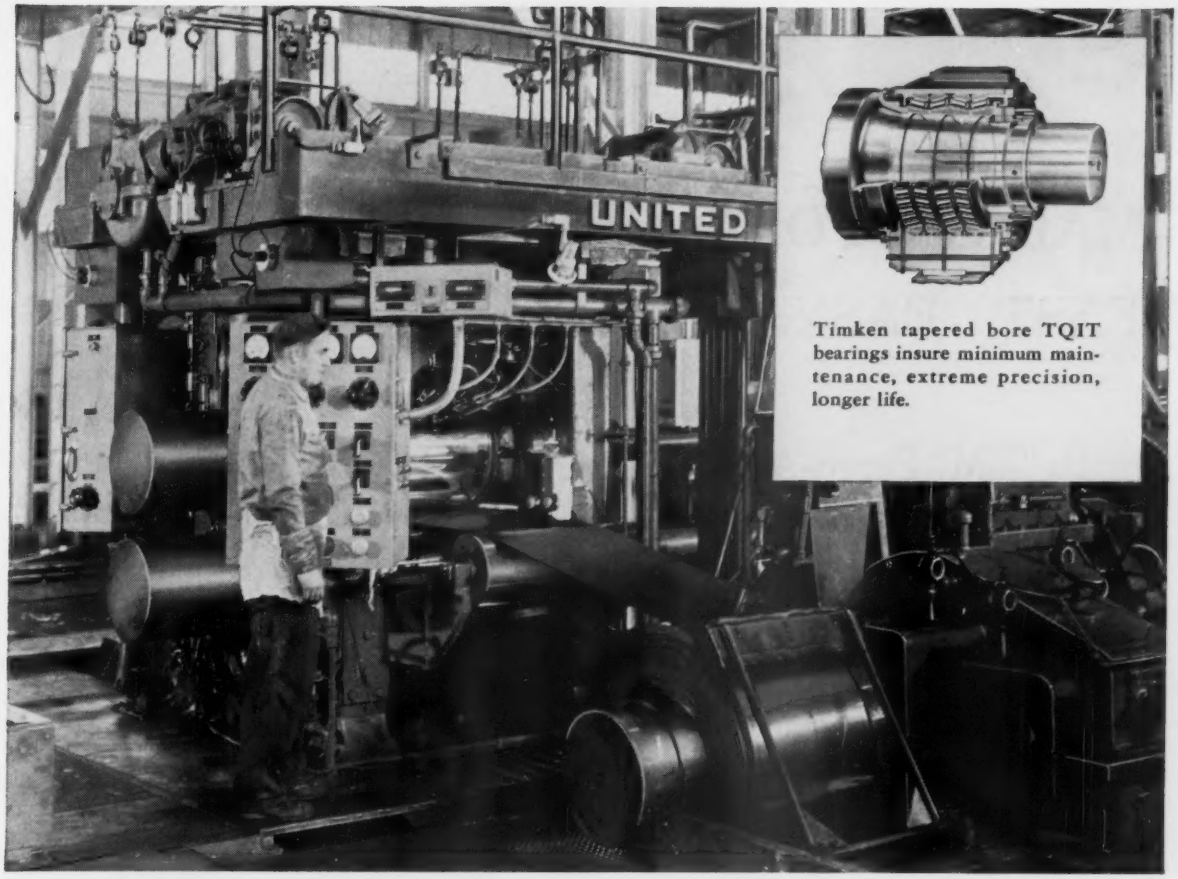


Timken tapered bore TQIT bearings insure minimum maintenance, extreme precision, longer life.

2-high temper pass mill starts faster, runs smoother on TIMKEN® TQIT bearings

THIS 2-high temper pass mill, built by United Engineering and Foundry for Alan Wood Steel Company, uses tapered roller bearings of the TQIT type, designed and developed by The Timken Roller Bearing Company.

Higher mill speeds are possible with Timken® bearings. They reduce starting resistance. That's because Timken bearings practically eliminate friction. Their geometric design gives them true rolling motion. Precision manufacture makes them live up to their design. All this makes for smoother, more dependable operation.

Timken tapered bore bearings combine interference fit with easy removal. They can be removed from the roll neck by expanding the cones hydraulically. Excessive scuffing and neck wear are eliminated. Greater stability between cones and roll neck distributes the load within the bearing. Improved fillets and larger necks are possible. This means you get the lowest possible neck stress and deflection.

Lubricant costs are cut because Timken bearings use economical grease lubrication. No lubricant is lost during roll changes. And rolls can be changed faster because there are no tubes or pipes. The tapered design of Timken bearings lets them take radial and thrust loads in any combination—no need for special thrust bearings that increase costs and complicate designs.

Be sure you get all the advantages of Timken TQIT bearings in the machines you buy or build. For more information call or write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

Circle 593 on Inquiry Card—Page 51

MAKE CUPOLA ADDITIONS FAST...EASY...ACCURATE

with "EM" Ferro-Alloy Briquets

FOUR KINDS of "EM" briquets are available for cupola additions: Chromium, Ferromanganese, Silicomanganese, and Silicon.

Three types of shipment are offered to meet the varied needs of the foundry industry: packed on pallets, packed in 250-lb. bags, or bulk.

Pallets facilitate handling, storage, and inventory control, and can be moved either by lift truck or overhead crane.

To aid in control of composition, each "EM" briquet contains a definite weight of alloying metal and is designed to minimize oxidation loss.

For further information on how "EM" briquets can help you, contact the ELECTROMET office in your area. Ask for booklet "Briquetted Alloys for the Iron Foundry Industry."

ELECTRO METALLURGICAL COMPANY
A Division of
Union Carbide and Carbon Corporation
30 E. 42nd Street UCC New York 17, N. Y.
Offices: Birmingham • Chicago • Cleveland
Detroit • Houston • Los Angeles
Phillipsburg, N. J. • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company,
Division of Union Carbide Canada Limited,
Welland, Ontario

METALS DO MORE ALL THE TIME ... THANKS TO ALLOYS

Electromet
Trade-Mark

FERRO-ALLOYS AND METALS

The terms "Electromet" and "EM" are registered trade-marks of Union Carbide.

"EM" briquets contain exact weights of the alloying elements and thus make exact cupola additions easy.

IMPROVE MACHINABILITY OF GRAY IRON

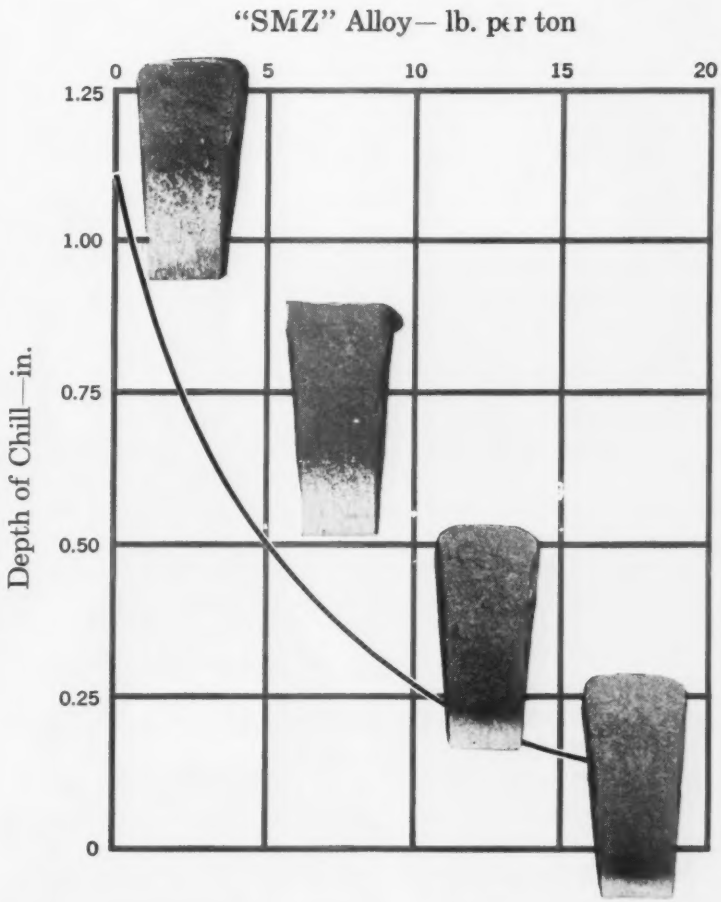
...eliminate hard spots with SMZ alloy

The chill blocks at the right clearly show how the chilling properties of gray iron are sharply reduced by small ladle additions of SMZ alloy, a strong graphitizing inoculant containing silicon, manganese, and zirconium. The blocks were poured from a 3.15 per cent carbon, 1.80 per cent silicon iron. Additions of 5, 8, and 16 pounds of SMZ alloy per ton (0.15, 0.25, and 0.50 per cent silicon) progressively reduced the chill depth from 1.09 in. for the untreated iron to 0.19 in. for the iron which received the heaviest addition.

The exceptional ability of SMZ alloy to eliminate chill in corners and thin sections vastly improves the machinability of iron. Foundries have reported that inoculating iron with SMZ alloy increases the machining rate by as much as 25 per cent. As little as 2 to 4 pounds of the inoculant are sufficient to eliminate hard corners and edges in light castings. For harder irons of low carbon and silicon contents a larger addition of the alloy may be required.

Write or phone your nearest ELECTROMET office for more information on this important ladle-addition alloy. Ask for the booklet, SMZ Alloy—An Inoculant for Cast Iron. An ELECTROMET representative will also be glad to give you all the technical details.

Offices: Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, Phillipsburg, N. J., and San Francisco. In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario.



ELECTRO METALLURGICAL COMPANY
A Division of
Union Carbide and Carbon Corporation
30 E. 42nd Street UCC New York 17, N. Y.

Electromet
Trade-Mark

FERRO-ALLOYS AND METALS

The terms "Electromet" and "SMZ" are registered trade-marks of Union Carbide.

Circle 594 on Inquiry Card—Page 51

YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

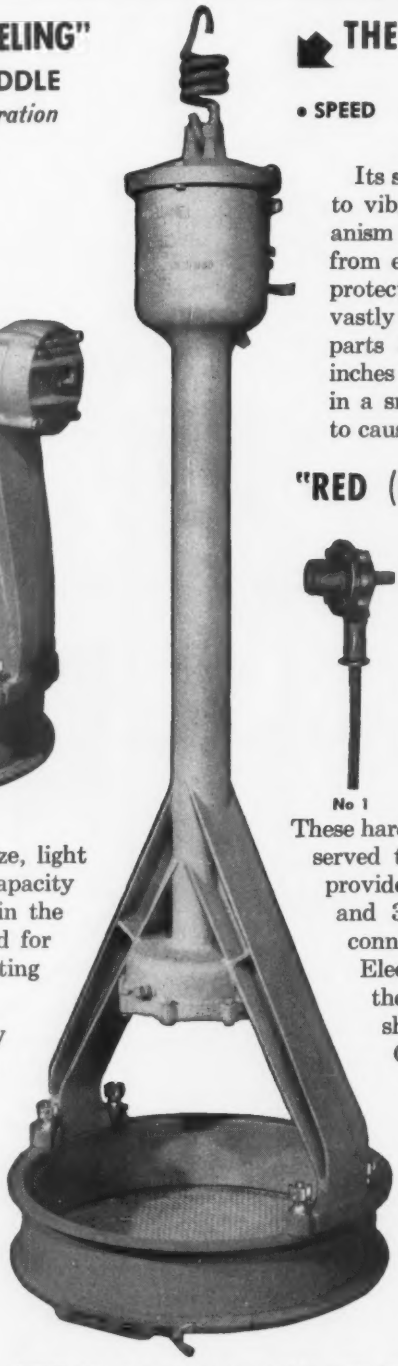
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



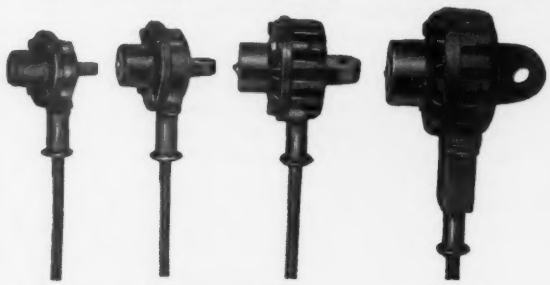
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area — are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

"Our equipment has to produce — so we got PANGBORN BLASTMASTERS"

says Mr. W. BLACKMER, Foundry Superintendent,
Muskegon Piston Ring Company, Sparta, Michigan

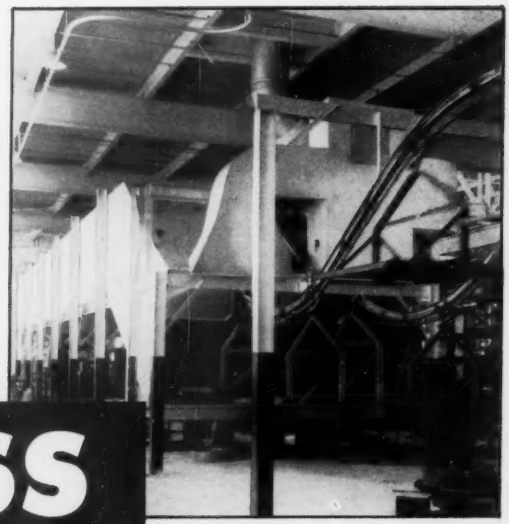
4 Blastmaster® Barrels replace 6 air blast barrels and 10 tumbling mills . . . cut two and three shifts a day to just one

"We maintain over 4,000,000 finished castings in stock for immediate shipment. To keep this stock replenished, our blast cleaning equipment has to really turn out the work. And we want a good job, too! We have found that our Pangborn Blastmasters fill the bill on both points—production per manhour is amazing."

If *you* need blast cleaning equipment, look at all makes. Then check the Pangborn Blastmaster. You'll find it offers many exclusive features plus a choice of sizes to fit your needs—1½, 3, 6, 12, 18 and 27 cu. ft. Write for Bulletin 703 to PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Maryland. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn blast cleans cheaper

Circle 596 on Inquiry Card—Page 51



2 ROSS Controlled AIR UNITS

★ **Help to Produce Better Castings**

★ **Help to Lower Production Costs**

ROSS CORE OVENS

Properly controlled heat is the key to core baking that is consistently successful. Uniformity in baking in either batch or continuous ovens depends largely upon the skill with which the hot baking air is made to enter and then to circulate throughout the oven.

To accomplish this, engineers must know the behavior of air under all conditions of temperature and pressures, and how to control that air.

The consistently efficient operation of Ross Core Ovens in both ferrous and non-ferrous Foundries can be traced right back to this understanding of air movements.

ROSS CUPOLA AIR PRE-HEATERS

Here, too, the control of both the heating and the flow of the hot combustion air for the cupola charge is based on a thorough knowledge of air behavior.

The ROSS Hot Blast System delivers air up to 500°F. The new ROSS Tubular Heater ranges up to 1000°F. at 5 pounds pressure or higher. Both of these can be tied in with present cupola operations without interfering with them. Existing blowers can be used.

You don't have to wait for a new foundry or new cupola to take advantage of the operating benefits these two ROSS Units can bring to your production schedule and cost structure. Why not ask to have a Ross Engineer call and discuss your problem of core curing and of getting better production from your furnace.

J. O. ROSS ENGINEERING CORPORATION

Main Office: 444 MADISON AVENUE, NEW YORK 22, N.Y.

ATLANTA • BOSTON • CHICAGO • DETROIT • LOS ANGELES • SEATTLE

welcome to our town!

The Chas. Taylor Sons Co., a subsidiary of National Lead Co., extends to our friends attending the AFS Castings Congress, a hearty welcome to Cincinnati, our home town since 1864.

While here, we hope you will visit us at our convention quarters in the Sheraton-Gibson. We'll be delighted to see you . . . to meet old friends and make new acquaintances . . . to discuss Taylor Refractories . . . how we can better serve you . . . help you obtain more profitable production.

See You in Cincinnati!

Can YOU tell the difference

in this Coke?

All three pieces of this ABC Foundry Coke look as much alike as peas in a pod. But actually they're counterparts in only one particular — their uniform high quality and efficient performance for the job that each is designed to do.

The No. 1 ABC Coke is the standard type made for foundries producing gray iron castings who require uniformly *high* carbon pickup as well as *high* melting temperatures. Gray iron foundries find it gives them outstanding performance.

The No. 2 ABC Coke is the Malleable "C" Type produced especially for foundries requiring a *medium* carbon pickup and *high* melting temperatures.

The No. 3 ABC Coke is the Malleable "B" Type produced for foundry operations requiring a *low* carbon pickup and *high* melting temperatures.

All three types of ABC Coke are regularly produced under rigid laboratory controls from the finest quality of selected coals from our own mines blended with the very best of the low volatile Pocahontas coals from West Virginia. You can be sure that ABC has a coke that will give you the best melting performance regardless of your requirements. Your inquiries are invited.

ALABAMA BY-PRODUCTS CORPORATION

General Sales Office: First National Building, Birmingham, Alabama

Sales Agents | GREAT LAKES FOUNDRY SAND COMPANY, Detroit; ST. LOUIS COKE & FOUNDRY SUPPLY CO., St. Louis; THE RANSON AND ORR COMPANY, Cincinnati; KERCHNER, MARSHALL AND COMPANY, Pittsburgh; BALFOUR, GUTHRIE & COMPANY, LTD., San Francisco; ATWILL COKE AND COAL COMPANY, Chicago.

Circle 599 on Inquiry Card—Page 51

MATCH PLATES • COPE & DRAG
PATTERN CASTINGS
PRESSURE CAST AL
BOXES • MATCH
CORE BOXES • D
• CORE BOXES
& DRAG SETS
PATTERN CAS
BOXES • MA
• COPE & D
MATCH PL
PRESSURE
CAST AL
PATTER
PLATES
CORE
DRY
PR
C
PLATES
& DRAG
MATCH PLATE
CORE BOXES •
PATTERN CASTINGS • MA ATES • COP
PRESSURE CAST ALUMINUM • CORE BOXES
BOXES • MATCH PLATES • COPE & DRAG SE

TCH PLATES • COPE &
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CASTINGS •
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CORE BOXES
ST ALUMINUM
RYER PATTERNS
PE & DRAG SETS
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NUM • CORE BOXES
• DRYER PATTERNS •
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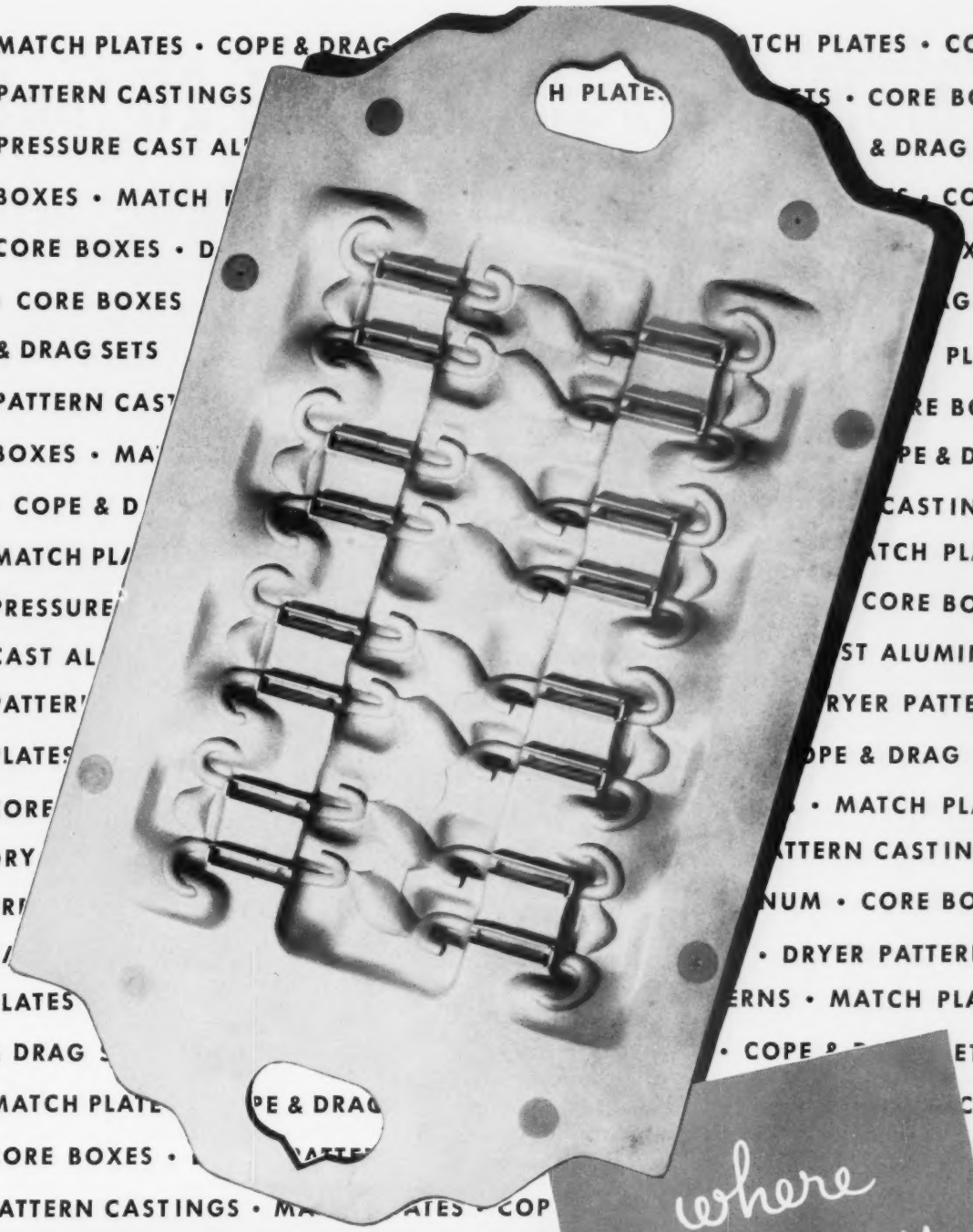


where Accuracy counts!

ACCURATE MATCH PLATE CO.
1847 WEST CARROLL AVENUE
CHICAGO 12, ILLINOIS

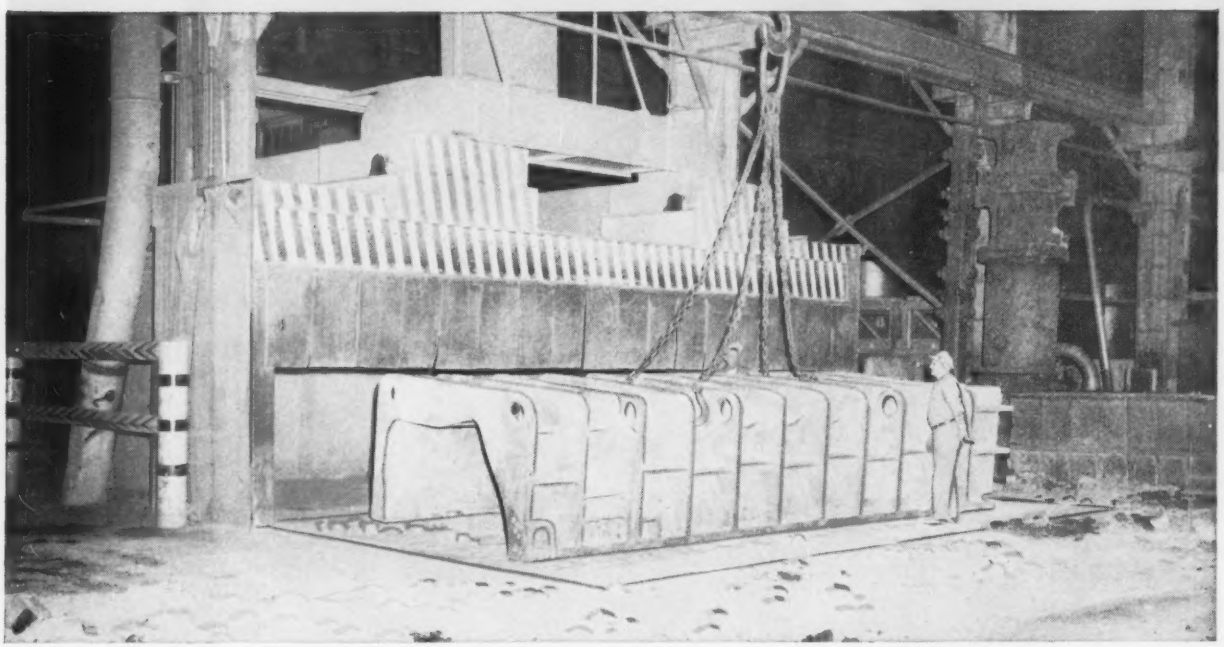
CORE BOXES • DRYER PATTERNS • MATCH PLAT
DRAG SETS •

Circle 600 on Inquiry Card—Page 51

problem of shaking out 28-foot solved by SIMPLICITY

the problem: How to clean huge steel mill roll flasks.

- The Place?—The Ohio Steel Foundry Co., Lima, Ohio.
- Additional problems?—The size of the task! Roll flasks are as long as 28 feet—— with copes and drags weighing up to 75 tons each with sand.
- What about sand lumps?—These are to be reduced to grain size, and removed to a sand reclaiming system.



The OS-A-VEYOR'S VERTICAL ACTION produces fast shakeout without travel of castings or flasks off of the machine deck. Adjustment can be made for extremely high speed travel, where desired.

flasks in Lima foundry

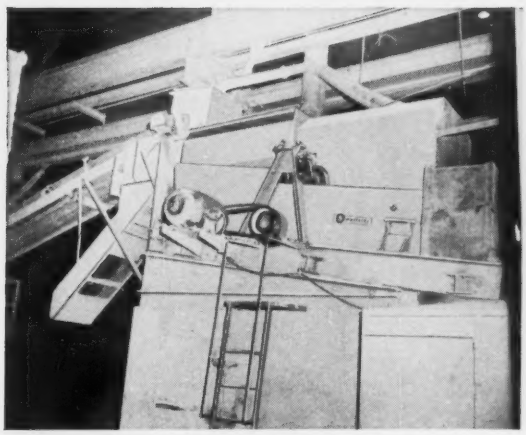
the solution:

Three 8' 6" x 12' Simplicity spring-mounted, Vertical Action shakeouts installed side by side, with decks flush with the foundry floor—providing a shakeout area of 12' x 26'. Just 2 minutes on the shakeout thoroughly cleans these flasks, where several hours were previously required to clean them manually.

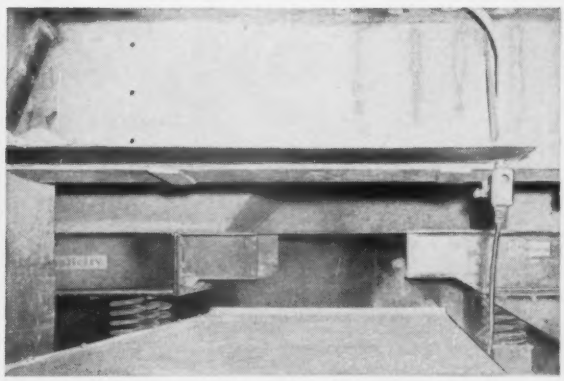
For handling the sand, four Simplicity Vibrating feeders were installed under the shakeouts, providing uniform feeding of the sand through the deck openings to a 3' x 29' Simplicity Positive Action vibrating conveyor. A belt conveyor then takes the sand above floor level to a Simplicity Ring Crusher Screen, which reduces the sand lumps to grain size. A bucket elevator then takes the sand to a dry-reclamation system.

A unique feature of this installation is the dust-collector system designed by Mr. James Gaffney, Plant Engineer at The Ohio Steel Foundry Co. The hood is automatically placed over the shakeout by means of an overhead track, with the dust being removed by an overhead duct and blower system. After cleaning, the hood retracts for easy removal of the flask.

For the solution to your shakeout and sand reclaiming problems write us today.



This enclosed 4' x 12' Model D Simplicity Ring Crusher Screen has two sets of free-turning crushing rings which reduce the sand lumps to grain size. Available in many sizes, these screens are real money savers!



The four feeders, shown above, receive the sand from six hoppers installed under the shakeout. The conveyor, with partial dust cover, runs perpendicular to the feeders' direction of flow.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario
FOR EXPORT: Brown and Sites 50 Church St., New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY • DURAND 7, MICHIGAN

197

F-E PROVEN

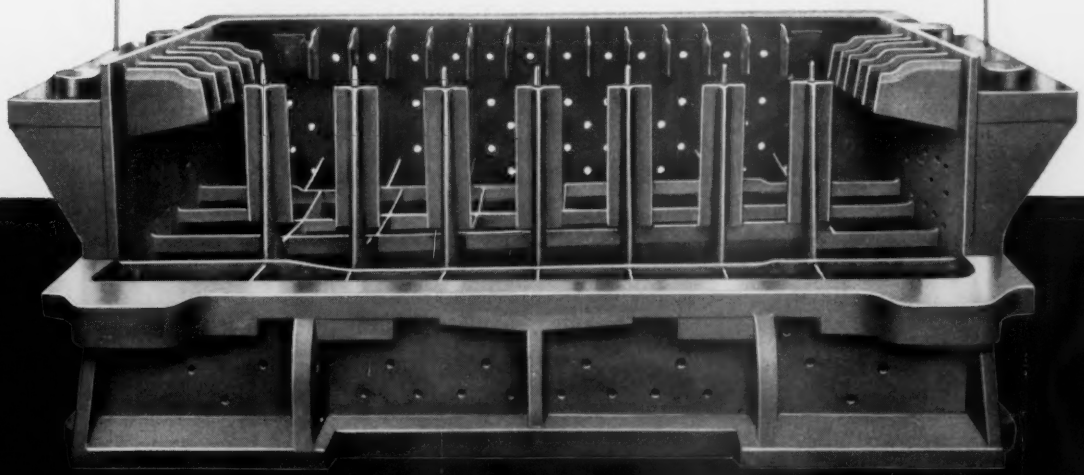
AUTOMOTIVE CRANKCASE FLASK: Constructed and machined to meet the exacting specifications of high speed production of V-8 cylinder blocks on an automatic index type molding system.

SPECIAL EQUIPMENT FLASKS: Fabricated for a leading electrical manufacturer to produce motor frames and end shields on a fully automated Diaform molding unit. Accurate close tolerance machining insures smooth, positive handling and indexing.

COMPLETE, MODERN FACILITIES ASSURE PROMPT DELIVERY. FLASK INQUIRIES INVITED.

PRODUCTION PERFORMANCE

HEAVY-DUTY BATHTUB FLASK: Utilized by the plumbing ware industry for volume production with automatic index molding equipment. This large, complex flask demonstrates the engineering ability and fabricating facilities available at Foundry Flask & Equipment Company.



CORRUGATED WALL FLASK: Formed reinforcements provide maximum strength and rigidity at minimum weight and cost. Suitable for conventional jolt-squeeze or roll-over operation.

SMALL PARTS FLASK: For jobbing foundry use. Lightweight design and construction make them ideal for squeeze, pneumatic-ram or stack molding.

FFE COMPANY • FLASKS • PINS and BUSHINGS • BOTTOM BOARDS • HOOKS

FOUNDRY FLASK and EQUIPMENT COMPANY

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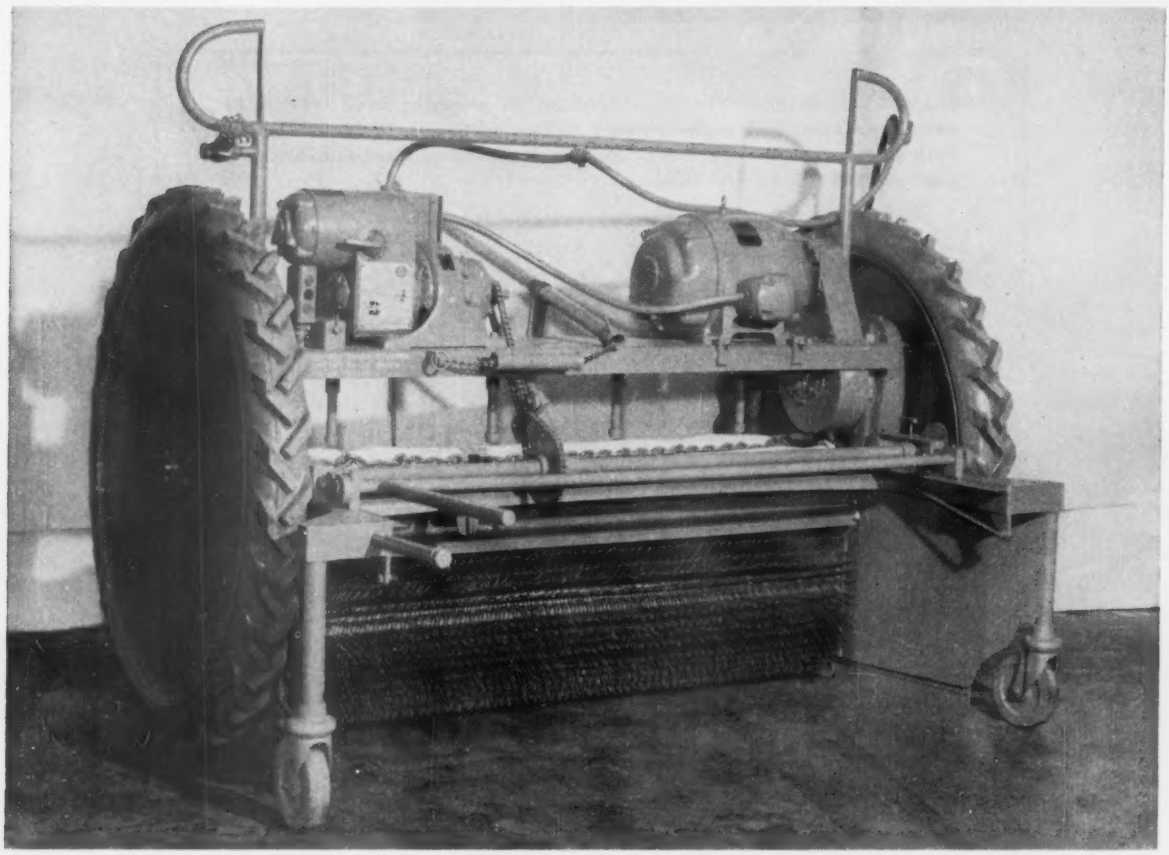
The New Moulders' Friend
FINDS FRIENDS EVERYWHERE



MOULDERS like The New Moulders' Friend sand conditioner, because the blending action of the rotary wire brush thoroughly mixes and aerates the sand, making it easier to put up more and better molds.

NIGHT CREWS like it, because it eliminates much manual labor and does a better job of conditioning the sand. With this completely self-propelled machine one man can condition more than two tons of sand per minute.

SAND CONTROL MEN like it, because it does such a thorough job of mixing, moistening and screening that they really can control the sand.

MAINTENANCE MEN like it, because it has few moving parts to keep in order.

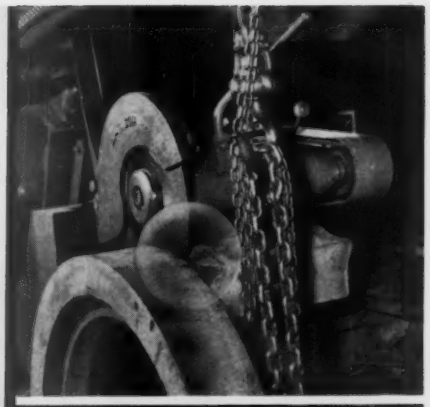
YOU will like The Moulders' Friend because, it pays for itself quickly with better castings and labor saved.

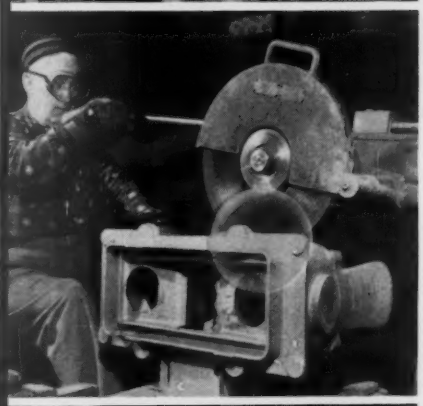
Investigate The Moulders' Friend today. See one in operation.

"The Moulders' Friend" **— — Dallas City, Illinois**

For all-around usefulness ...you can't beat the

BN





Norton Reinforced Resinoid Wheel brings strength, safety and "TOUCH OF GOLD" economy to many jobs

Fast, cool grinding action, great safety, long life and a wide job range are advantages that make the Norton BN reinforced resinoid wheel one of the most popular and useful foundry production tools.

High resistance to breakage is assured by its tough resinoid bond and glass cloth-reinforced structure. Primarily a cut-off wheel, its rough, knurled sides provide additional cutting action. As a result, it's unequalled for cutting-off gates and risers on non-ferrous castings, as well as for light snagging, slotting, cleaning and deburring of both ferrous and non-ferrous castings.

You can use it on your portables, bench stands, swing frames, floor stand grinders and on any type of heavy or light duty cut-off machine — and you'll profit by its money-saving "Touch of Gold" every time it goes into action.

The Rubber Bonded **RN**... Another Norton Standout

For your cutting-off jobs where a rubber bonded wheel is preferable, the Norton RN is ideal, especially on ferrous metals. Strongly reinforced, fast cutting and long-lasting, it's an excellent value at nominal cost.

See Your Norton Distributor

about a demonstration of Norton reinforced wheels in your plant. And ask him for the big reinforced wheel catalog with net prices. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1748

NORTON

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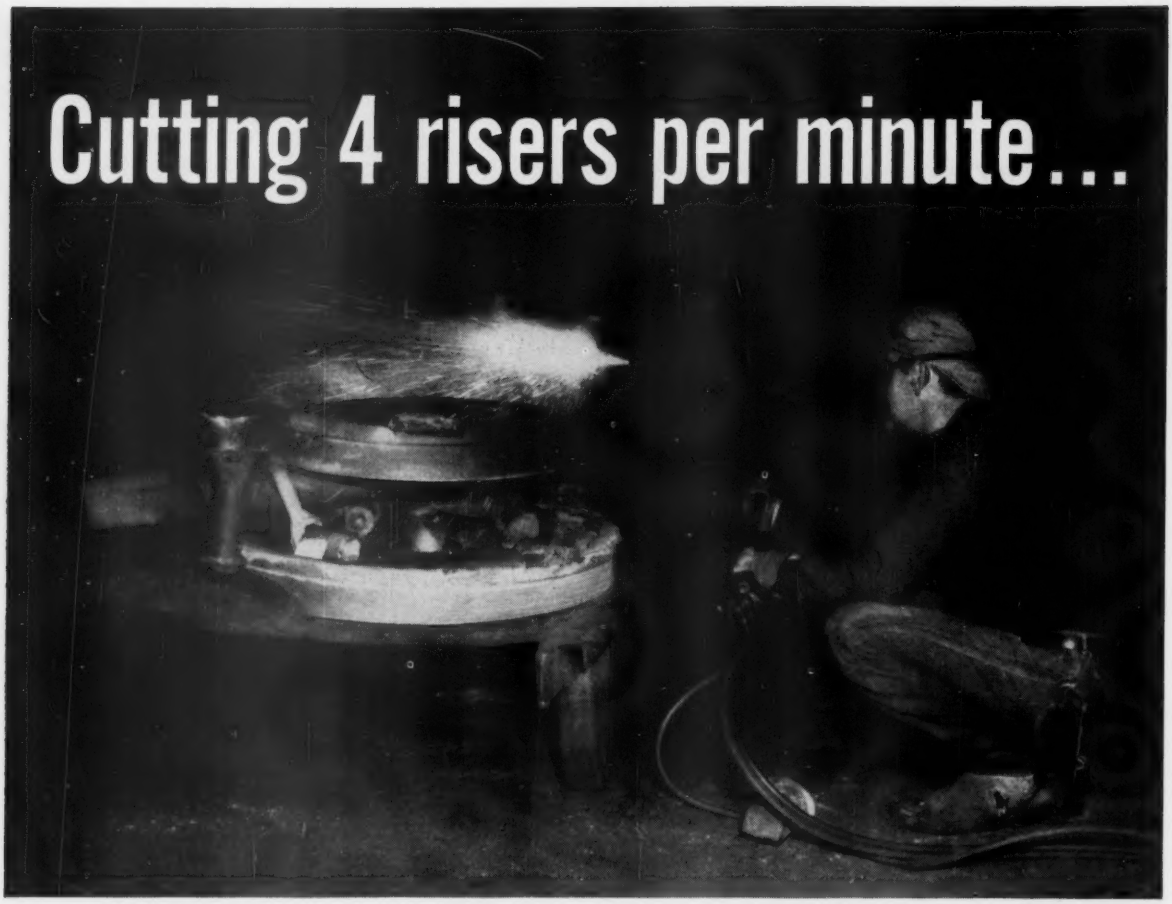
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

Circle 604 on Inquiry Card—Page 51

Cutting 4 risers per minute...



Lightweight and easy to handle, this OXWELD powder-cutting blowpipe makes fast work of risers.

Powder-Cutting speeds removal operations 300%

Removing risers from stainless steel castings need no longer be costly and time consuming. Pictured above is a typical powder-cutting operation at the Ohio Steel Foundry Company, Springfield, Ohio. Here, 2 by 4 inch thick stainless steel risers are removed by powder-cutting in only 15 seconds. By methods previously used, this operation took up to four times longer.

In the powder-cutting process metal powder is automatically injected into an oxygen flame to increase the flame's heat and severing action speed. The powder process is helping users gain new efficiency and speed in the removal of gates and risers, sand incrustations, and casting defects.

The powder-cutting blowpipe used in this operation, an OXWELD AC-4, is designed for hand cutting of oxidation resistant metals such as stainless steel, chrome alloys, and cast iron. Heavier apparatus is also available for manual and mechanized operations.

Increase your production and profit—call your local LINDE representative, or write for illustrated literature on LINDE's modern processes. Start saving now, do it today.

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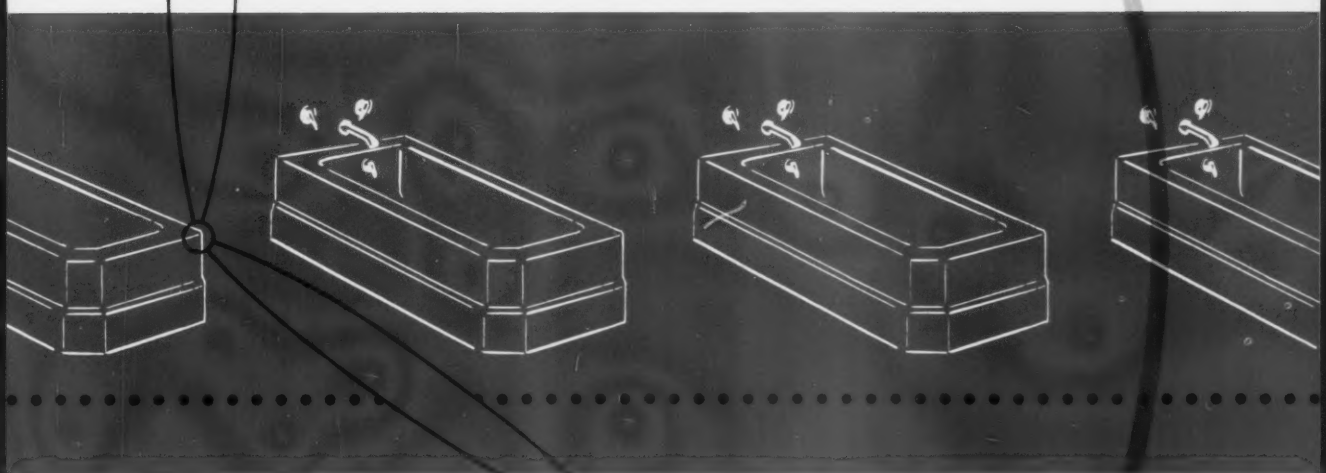
Circle 605 on Inquiry Card—Page 51

Circle 606 on Inquiry Card→

4th in a series . . .

a bathtub
every minute . . .
on the HERMAN
STATIONMASTER



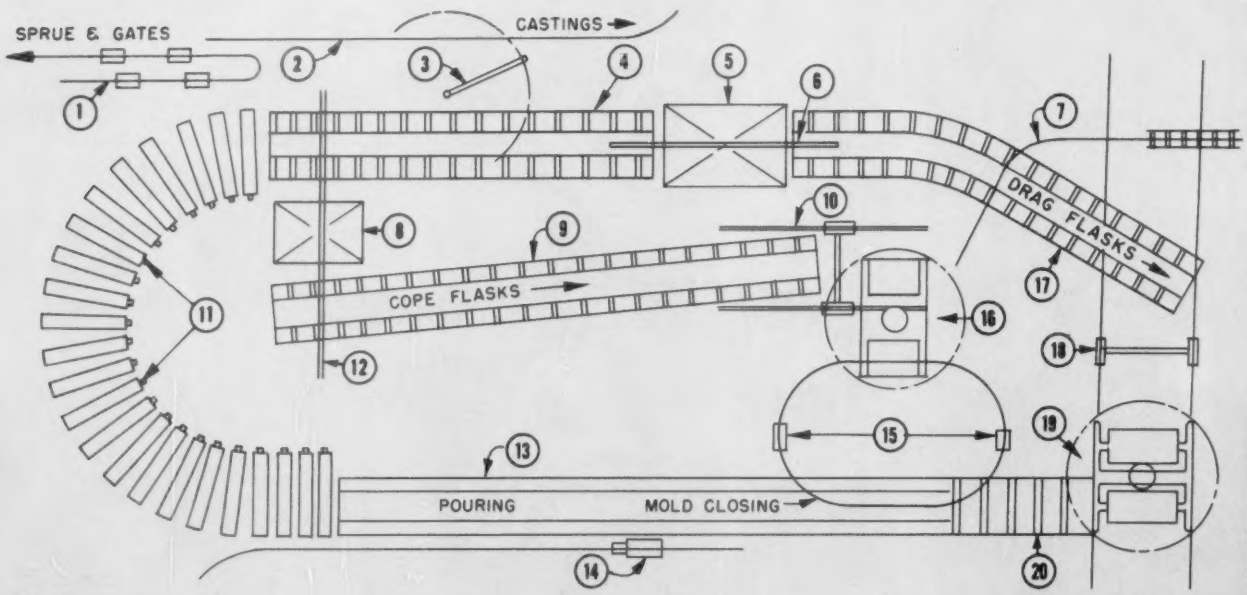
why foundrymen
buy a HERMAN
molding machine

The Herman Stationmaster is a revolutionary molding machine development. Its ability to produce castings of uniform quality on a volume production basis is another reason why foundrymen the world over buy Herman Machines.

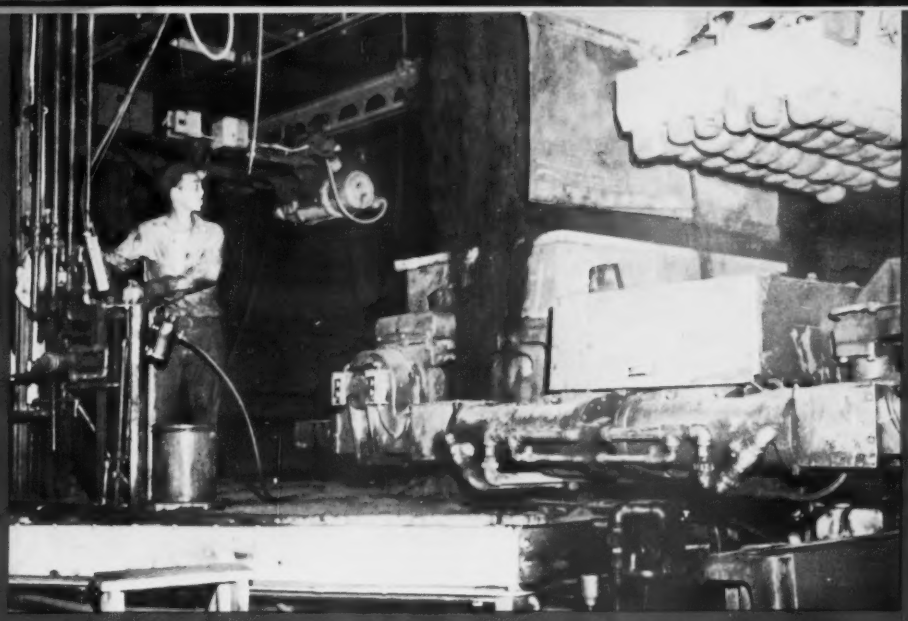
These automatic two-station indexing machines have produced in excess of 60 bathtub molds per hour at the Chattanooga, Tennessee, Division of Crane Company.

The versatile Stationmaster can work with equal efficiency in the production of railroad castings such as car wheels, side frames, and bolsters; municipal water pipe fittings; furnace boiler sections; textile machine castings; and a wide variety of other casting applications where a foundry is called on to produce large castings in volume.

The Crane installation is producing a complicated casting with a minimum of rejects: The bathtub incorporates an apron which gives it a vertical side when installed . . . causing an offset parting which requires the use of specially shaped flasks. Section thickness is only about ¼"; making it necessary for patterns, flasks and molding equipment to produce an accurate mold cavity. Casting surface must be free of imperfections in order to take and retain the subsequent porcelain enamel coating. (Layout of the system is shown below.)



1. Sprue conveyor
2. Cooling conveyor
3. Jib crane
4. Gravity roll conveyor
5. Drag Shakeout
6. Monorail hoist
7. Pattern monorail
8. Cope shakeout
9. Gravity roll conveyor
10. Crane
11. Powered roll conveyor
12. Monorail hoist
13. Walking beam conveyor
14. Pouring ladle
15. Mold closing hoists
16. Cope Stationmaster molding machine
17. Gravity roll conveyor
18. Crane
19. Drag Stationmaster molding machine
20. Powered roll conveyor

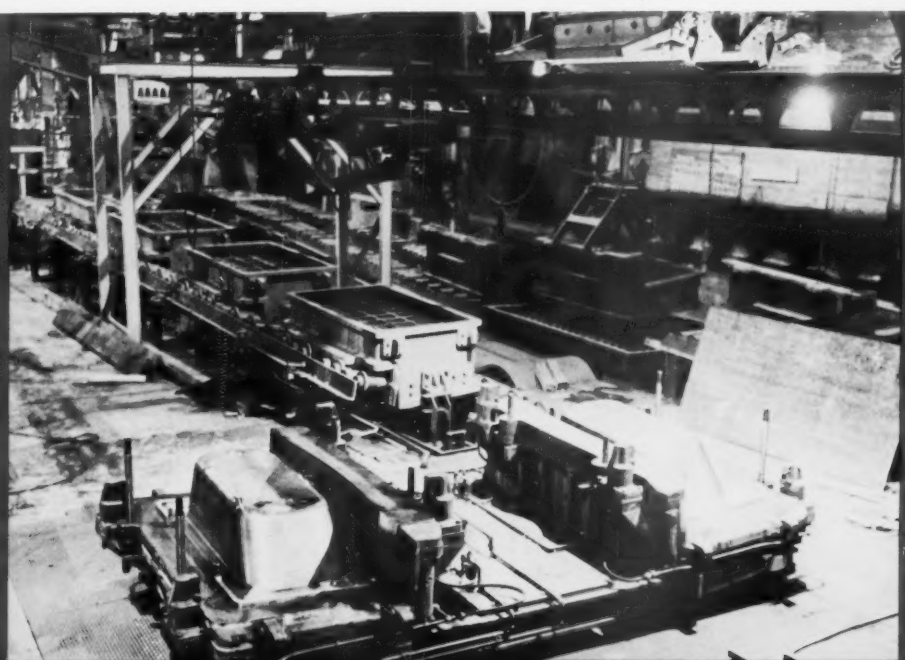


Filling drag flask with sand at a Stationmaster machine

Essentially, the system consists of a cope and drag machine, each machine employing two patterns. One mold is thereby rammed while the pattern is being drawn from the other mold. Flasks are rammed solely by jolting.

The drag flask is lowered by crane onto the jolt machine after the pattern has been indexed into position. With the press of a button, the following operations occur: (1) flask clamped to pattern; (2) flask filled from hopper; (3) jolting starts. Ten seconds later, ramming weights are removed and pattern and flask indexed to pattern draw position. Simultaneously, the pattern and flask are rolled over, and the other pattern is placed in position. Mold is drawn and placed on a power roller conveyor. It's on its way to the mold closing station.

A cope flask arrives at the Herman Jolt Indexing Machine, is picked up by a crane, and deposited on stripper pins. Automatically released, it now lowers onto the pattern and, with the press of another button, the flask is filled; jolting action starts. Eight seconds later, sprue pins are removed and pattern and mold raised and indexed to the stripping station. Four push-off pins raise the mold off the pattern. The completed cope is picked up by a hoist. Simultaneously another hoist is closing a mold. The closed mold moves on to a roller conveyor, is clamped and poured.



Stationmaster cope molding machine with cope flask return conveyor at left, drag at right.

The production records being set by Crane Company using these Herman Stationmasters are typical of what can be accomplished with such versatile, rugged units.

These Herman machines are doing an equally outstanding job in many other foundries in the U.S., as well as England, Australia, Switzerland, Israel and Brazil.

The Herman Stationmaster is only one of 11 different types of Molding Machines we manufacture to fit every foundry operation.

What's **your** problem?

HERMAN PNEUMATIC MACHINE CO.

UNION BANK BUILDING,

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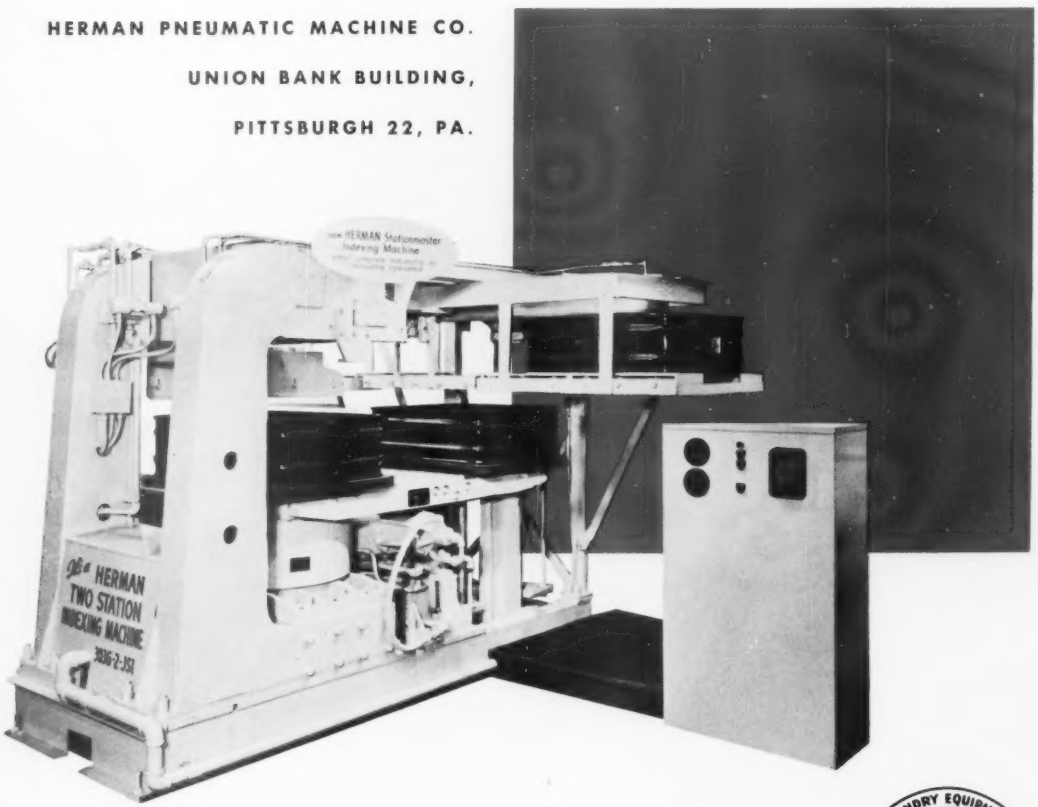
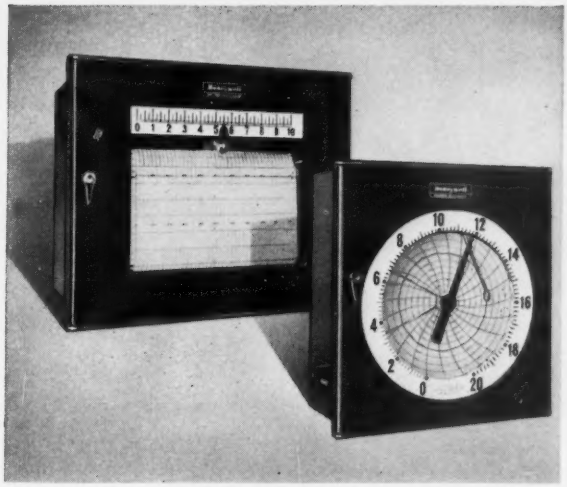


MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

HERMAN

Best Known Name in Molding Machines



Precision Class 15 Line of *ElectroniK* instruments. Calibrated accuracy, ± .25% of span. Complete selection of many types of indicating and recording models, including electric and pneumatic controllers of most advanced type, and multipoint monitoring or recording of 2 to 400 points.

for accuracy, versatility, price

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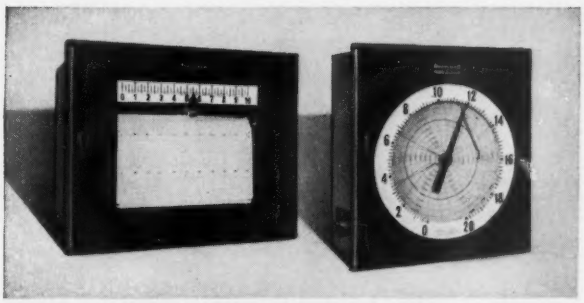

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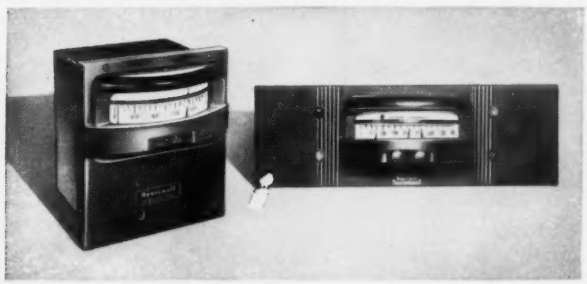

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Your local Honeywell engineer will be glad to consult on your requirements. Call him today . . . he's as near as your phone.

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We are looking forward to seeing all our friends and discussing our mutual problems together.

Allow me to suggest in your plans, time to visit some new developments in this area.

H. H. McVay

F.O.B. POINTS: CINCINNATI, OHIO; DALLAS, TEXAS; JERSEY CITY, N. J.; EMERYVILLE, CALIF.
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PHONE: WILLOW 1-2600

Circle 609 on Inquiry Card—Page 51

the RELIANCE FOUNDRY CO., Cincinnati, reports:

"Our savings in time and materials offset over 50% of the cost of KOPESEAL® cope and drag sealer."

"In the old days," says F. E. Hutchinson, vice president of The Reliance Foundry Co., Cincinnati, Ohio, "we sealed our copes and drags by rolling out mud balls to the desired diameters and lengths. This antiquated method is now taboo since we were introduced to KOPESEAL, which makes a very uniform seal of the molds.

"Our savings in time and materials offset better than 50% of the cost of KOPESEAL. In addition, it makes molder helpers available for other work. Also, we always know we have the correct diameters for various sizes of molds at hand when needed. Parting readily adheres to KOPESEAL, adding to the tightness of the sealing of molds.

"Since using KOPESEAL, we have practically eliminated 'runouts', which, of course, are both costly and hazardous."

Hundreds of other foundries have switched to KOPESEAL for more effective cope and drag sealing . . . in *less* time . . . at *less* cost!

PRESSTITE Sealing Compounds

PRESSTITE - KEYSTONE ENGINEERING PRODUCTS COMPANY

K A P

A DIVISION OF AMERICAN-MARIETTA COMPANY

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KOPESEAL® cope and drag sealer

precision sealing for precision casting, eliminates runouts, replaces mud or dough rolls!

- **Convenient, ready-to-use right from the carton!**
- **Uniform extruded diameters from 3/16" to 3/4", in 30" lengths!**
- **Excellent compressibility eliminates runouts!**
- **Positive seating permits accurate measurement of metal thickness!**
- **Self-dissipating. No residue to worry about... use it, seal it, forget it!**

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Railway and Power Engineering Corp., Ltd.
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Also Stocked and Distributed Under Following Brand Names:

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Toronto, Ont.—Canadian Hanson & Van Winkle Co., Ltd.

KOPEBEAD:
Philadelphia, Pa.—George F. Pettinos, Inc. • Hamilton, Ont.—Geo. F. Pettinos (Canada) Ltd. • Montreal, Que.—Geo. F. Pettinos (Canada) Ltd.
Kansas City, Kans.—Canfield Foundry Supplies.

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FOR A CONVINCING SAMPLE Contact your distributor

1 Beads of KOPESEAL, easily peeled from special paper backing, are placed on the drag prior to checking for correct cope seating. No mess, no mixing or forming.

2 KOPESEAL forms a continuous, uniform gasket-like seal around inside perimeter of the drag, preventing runouts when metal is cast.

3 Parting compound is dusted over KOPESEAL and the drag is ready to receive the cope. Subsequent inspection of compressed KOPESEAL head will indicate whether cope is perfectly seated and permits accurate measurement of metal thickness.

PRESSTITE Sealing Compounds

PRESSTITE - KEYSTONE ENGINEERING PRODUCTS COMPANY

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More and more, when industry wants a radiographic film for precision work, it calls on Ansco Superay "B". One of the first films tailored especially for industry, Superay "B" is the highest contrast Ansco film of them all—ideal for use with all voltages. Call on Superay "B" for consistently accurate readings of heavy metal weldments and castings—wherever outstanding definition and detail are desired.

For finest results, make sure to process with Ansco chemicals: Liquadol, Liquadol Replenisher, Liquafix.

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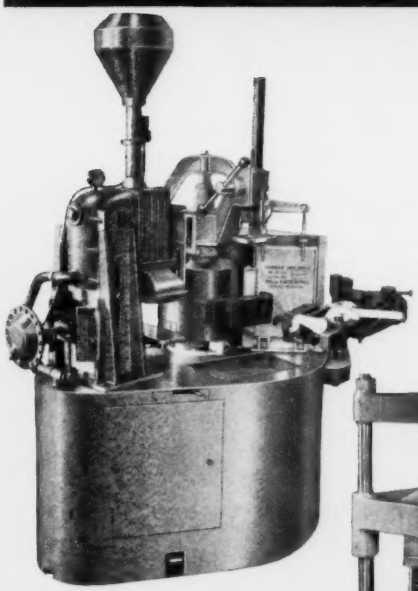
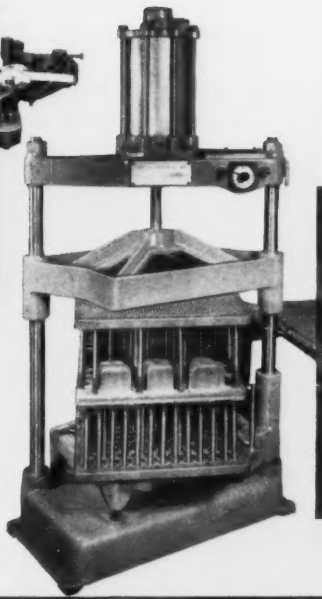
This Business RESERVED ...for the foundry with Shell Molding Equipment!

More and more design engineers are incorporating SHELL MOLD CASTINGS into plans and specifications. They know that — wherever specified — Shell Mold Castings reduce manufacturing costs by holding to extremely close tolerances — eliminating expensive machining operations — producing smooth finish castings that are uniform in every respect. This means plus business for the progressive foundry that is prepared to offer Shell Mold Casting service to customers.

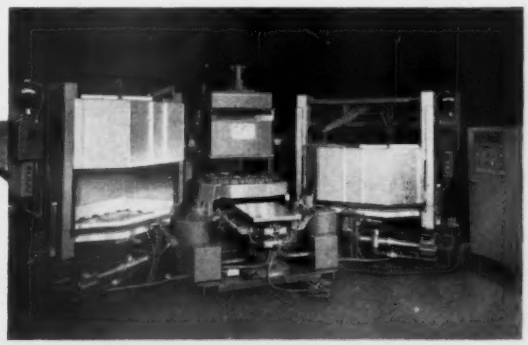
Pioneers and progressive leaders in the field, SHELL PROCESS, INC., is prepared to plan profitable Shell Molding operations for you. Be sure that this reserved business is reserved for you!



SHELL CORE BLOWER — Dual core box machine. Handles any type core box.



BONDER — Assures perfect bonding of any casting contour. Completely automatic. Available in 3 sizes.



TWIN — 2-station Shell Molding Machine. Takes 20" x 30" patterns. Operates on minimum power and air requirements. Can be operated by unskilled labor.

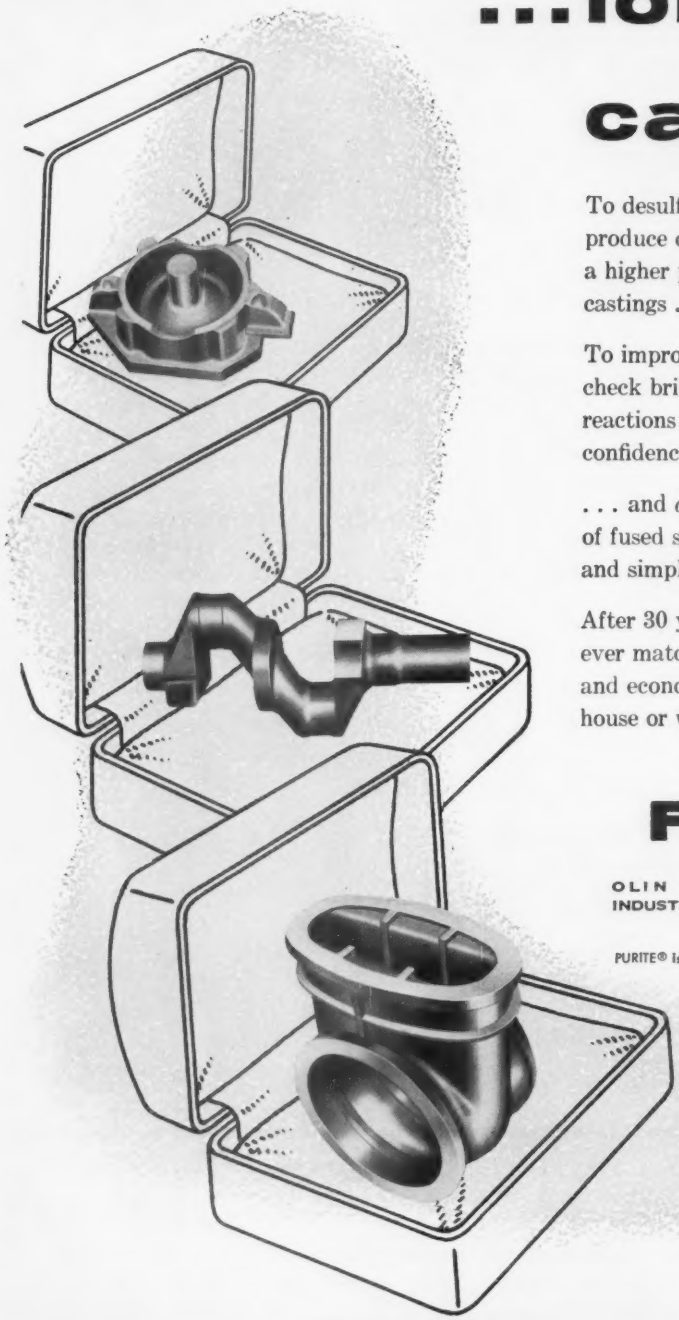
Write for *further details on the advanced Shell Molding Equipment illustrated here.*

SHELL PROCESS, INC.

Manufacturers of Shell Molding Machines and Allied Equipment

367 BLISS STREET • WEST SPRINGFIELD, MASS.

...for quality castings



To desulfurize iron to uniform specifications . . . to produce clean, quiet-pouring metal . . . to insure a higher percentage of strong, machinable castings . . . *count on* Purite.

To improve melting operations in the cupola, to check bridging, increase fluidity, speed combustion reactions . . . to permit use of high sulfur scrap with confidence . . . *count on* Purite.

. . . and *count out* Purite by the pig! The 2-pound pigs of fused soda ash eliminate weighing or measuring and simplify storage operations.

After 30 years of profitable performance, nothing has ever matched Purite for convenience, effectiveness and economy. Check your foundry supply house or write—

PURITE

OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.

PURITE® is a trademark

4719

Circle 613 on Inquiry Card—Page 51

Circle 614 on Inquiry Card→

Grinding costs roaring skyward? We can engineer savings for you

Most grinding costs are on the rise. Are your "routine" jobs still operating at what *was* peak efficiency? Call Peninsular's skilled abrasive engineers to survey your entire operation. Their analysis can increase efficiency, prolong wheel life . . . keep costs from skyrocketing.

For example, on this portable grinding operation, Peninsular grinding wheels cut faster and smoother. Hourly production increased, while operator fatigue was reduced. And the longer life built into Peninsular grinding wheels paid dividends by removing more metal per pound of abrasive.

Call, write, or wire us today!

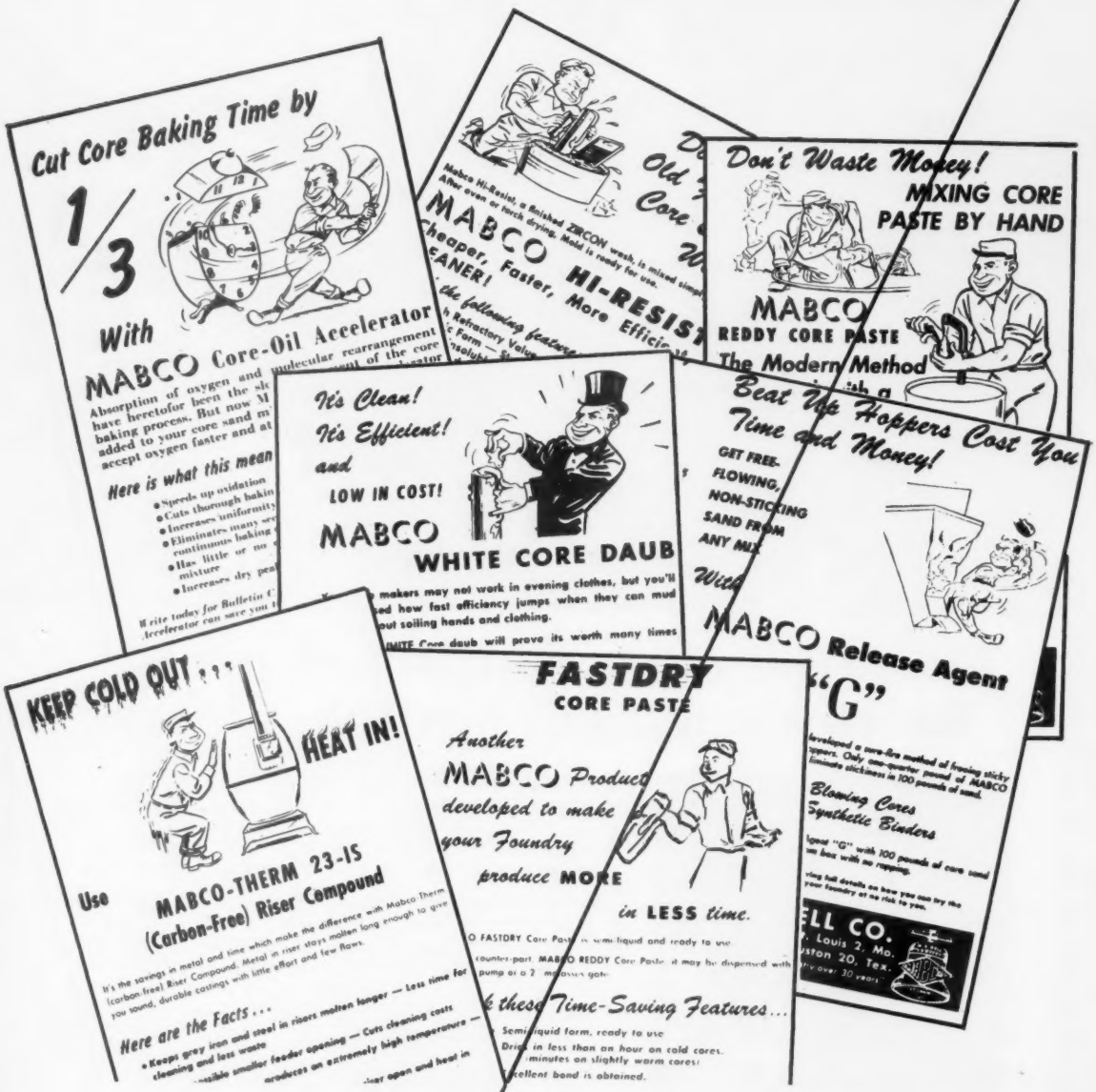
Resinoid and Vitrified Grinding Wheels

PENINSULAR

GRINDING PENINSULAR SINCE 1899 WHEELS

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS COMPANY—DETROIT, MICHIGAN

Through the Years—

THE FINEST IN FOUNDRY PRODUCTS AND EQUIPMENT

Also—

Aluminum Pattern Paint
Aluminum Plastic
Kuik Kore Kompound
Liberty Liquid Parting
and Everything for the Modern Foundry

MABCO Products

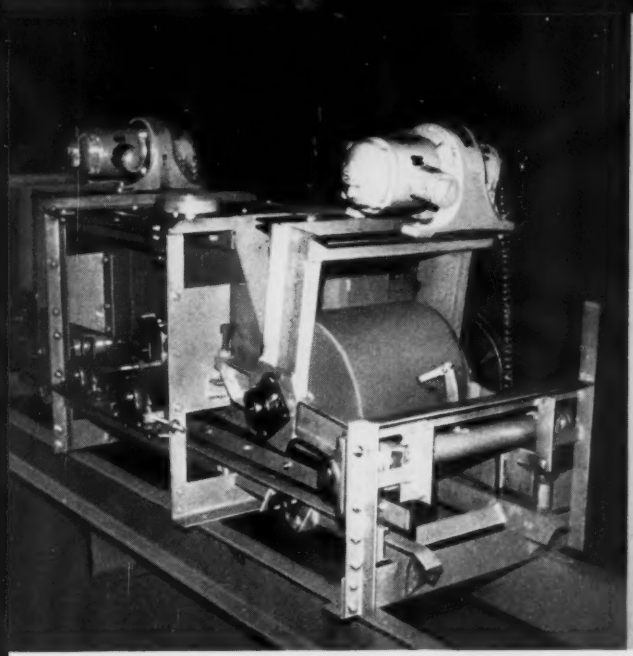
M. A. BELL COMPANY

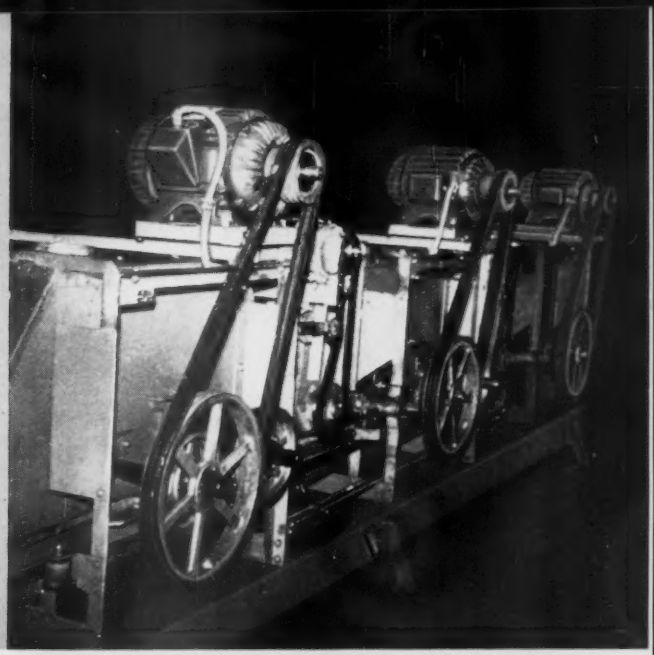
217 LOMBARD • ST. LOUIS 2, MO.
5802 COLFAX • HOUSTON 20, TEX.

"Serving the Foundry Industry over 30 years"

Circle 615 on Inquiry Card—Page 51

Circle 616 on Inquiry Card→





GET UP TO 85% MORE—AND BETTER—SAND, WITH...

PK Mixer-Muller
for better sand conditioning

[redacted]

Mr. Jules T. Parisi, President
Pekay Machine & Engineering Co. Inc.
865 N. Sangamon
Chicago 22, Illinois

Gentlemen:

In reply to your inquiry on the advantages of the Pekay Mixer Muller, we submit the following:

In the five years that we have had the Pekay unit together with the Pekay water proportioner conditioning our sand, it has always prepared uniform sand which gave us a very nice casting finish together with unlimited sand requirements.

Previous to this installation we had a batch type muller with which we had difficulty maintaining uniform sand. Our maintenance costs on the Pekay Mixer-Muller is negligible, being approximately $400.00 per year including parts and labor. We have experienced practically no down time during the above stated period of operation.

With the Pekay unit we have increased our permeability, flowability and green strength to our requirements. We reuse our sand approximately 15 times a day and find that the Pekay Mixer Muller has a definite cooling effect which keeps our maximum sand temperature thru-out the day down to approximately 740 F. at the molding stations. We have found that 21% of the sand cooling takes place within the Pekay unit.

A definite savings can be realized from the installation costs as the Pekay unit was put in place in less than 100 man hours.

We are very satisfied with the Pekay Mixer Muller and at the service we have received from your company.

Very truly yours,

[redacted]

WE'D LIKE TO SEND YOU a copy of this factual report on the actual 5-year performance of the PEKAY Mixer-Muller, from a prominent foundry. Write for it today!

EASILY INSTALLED RIGHT INTO YOUR PRESENT CONVEYOR SYSTEM

Day in and day out, foundries are getting up to 85% more sand volume with their PEKAY *Mixer-Mullers*—and at the same time, cutting operating costs sharply! Skilfully designed cutter wheels assure free-flowing sand, with lumps eliminated and with sand temperature reduced; and proper mulling continuously delivers sand in perfect condition for molds, which means a big cut in scrap losses. What's more, the amount of bonding clay and Bentonite which must be added drops sharply.

Other profits show up quickly, too, because power costs are reduced, and because maintenance costs are so much less with this easy-to-inspect, easy-to-service unit. The Mixer-Muller is strongly built but compact—and made to fit on your conveyor line without difficulty.

Yet with all these advantages, PEKAY *Mixer-Mullers* cost you less to buy—and less to install. In fact, it usually takes only about 100 man hours to put the unit in place. No wonder more and more foundries of all types and sizes are installing these efficient units!

★ **Write today for more detailed information about *Mixer-Mullers* and other PEKAY equipment and services for better sand-handling at lower costs.**

Specialists in Foundry Sand-Handling Engineering & Equipment

PEKAY MACHINE & ENGINEERING CO. INC.

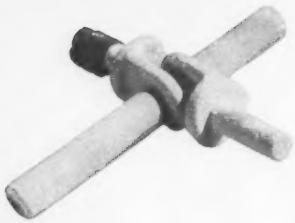
871 N. SANGAMON STREET CHICAGO 22, ILLINOIS

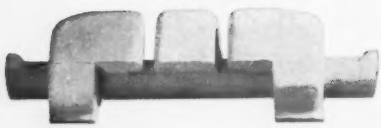
M-T-MATIC Elevator Conveyor Buckets
TROFF-O-MATIC Conveyors

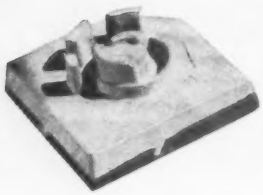
Gentlemen: Please send me details and price information on

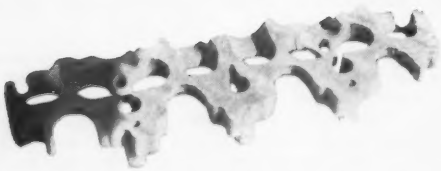
☐ **PEKAY MIXER-MULLER**
☐ **PEKAY M-T-MATIC ELEVATOR BUCKETS**

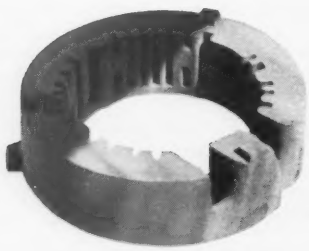
(NAME) _____
(COMPANY) _____
(ST. & NO.) _____
(CITY) _____ (ZONE) ____ (STATE) _____











Visit us...

in our suite
at the
SHERATON GIBSON HOTEL
CINCINNATI, OHIO
during the
61st Annual A.F.S. Convention

EVERY DELTA Foundry Product is backed by continuing and exhaustive laboratory research to safeguard quality and maintain absolute uniformity of the finished product. Every step in the manufacturing processes is under strict laboratory control and all raw materials must conform to rigid quality specifications.

...faster production

WITH DELTA

Delta Oil Products Co. not only pioneered the development of plastic-type core and mold washes but has continued to lead in the development of new and improved products for the production of better castings — faster and more economically.

Delta sales technicians are ready, at all times, to assist in the more effective and more economical use of core oils, core and mold washes and sand additives for increased efficiency and lower production costs.

MANUFACTURERS OF

CORE AND MOLD WASHES:

FOR STEEL:

*Special Core and Mold Wash Base
*SteelKoat
*PyroKoat-S
*SuperKoat
*ThermoKoat
*Z-Koat
*ZZ-Koat

FOR GRAY IRON AND MALLEABLE:

*GraKoat
*BlacKoat
*SuperKoat
*BlacKoat C-2
*BlacKoat C-4
*DriKoat B-3
*DriKoat B-5
*BlacKoat S-5
*PyroKoat-S
*PyroKoat-G

FOR ALL TYPES OF SAND CAST METALS:

*ThermoKoat
*Z-Koat
*ZZ-Koat
*SuperKoat

FOR NON-FERROUS METALS:

*NonferrusKoat
*SuperKoat
*GraKoat
*DriKoat F

# of finer-finish castings at lower cost...

FOUNDRY PRODUCTS

PARTING COMPOUNDS:

*Partex — Liquid Parting
*Super Partex — Liquid Parting Concentrates

MUDDING AND PATCHING COMPOUNDS:

*Sliktite *Ebony

MOLD SEAL COMPOUNDS

***NO-VEIN COMPOUND**

MOLD SURFACE BINDERS– Liquid

***DRI-BOND**

***BONDITE**

✻ A Foundry First — by Delta.

GRIPTITE CORE PASTE

CORE ROD DIP OIL

CORE OILS

CO_2 BINDERS

LIQUID RESIN BINDERS:

155-X Fast-Dri
168-X Fast-Dri
191-XX Fast-Dri

FOR SHELL MOLDS

DELTA-Dietert Process Binder 103XX
(For "D" process shell cores.)

FOR SAND:

*Permi-Bond (sea coal replacement)
*Sand Conditioning Oils
*96-B Sand Release Agent

DELTA

GET THE FACTS —

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

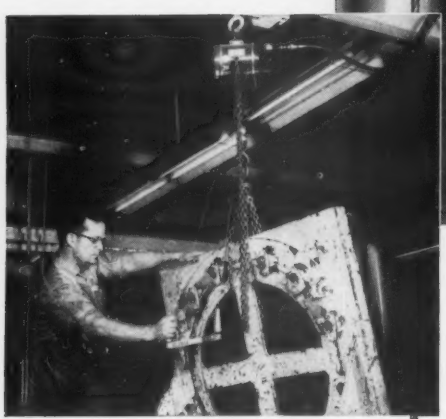
DELTA OIL PRODUCTS CO.

SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9
WISCONSIN

AIR LIFT

Faster! *Safer!*



DOUGLAS AIRCRAFT uses ARO Link Chain Hoist in tooling shop at their Santa Monica plant. Shown here, bulkhead fixture being lowered onto flat car.

NEW LINK CHAIN AIR HOIST!*

***ROLLER CHAIN ALSO AVAILABLE—ALL MODELS**

NEW Link Chain Hoist now added to the popular ARO line . . . up to 1000 lb. jobs!

VARIABLE SPEED . . . 0 to 38′ per minute . . . load can be inched or zipped.

AIR-POWERED FOR SAFETY . . . no spark hazard . . . explosion-proof motor . . . can't burn out or overheat . . . unaffected by dust or fumes.

LIGHTWEIGHT . . . only 29 lbs. . . . overall length 10½″. Can be converted to Roller Chain type if desired.

Also available, Roller Chain Hoists—2,000 lb., 1,500 lb., 1,000 lb., 500 lb., 300 lb., 100 lb.

See Your ARO Distributor

THE ARO EQUIPMENT CORPORATION

Bryan and Cleveland, Ohio

Aro of California, 3141 S. Grand Ave., Los Angeles 7
Aro Equipment of Canada, Ltd., Toronto 15, Ontario
Offices in All Principal Cities

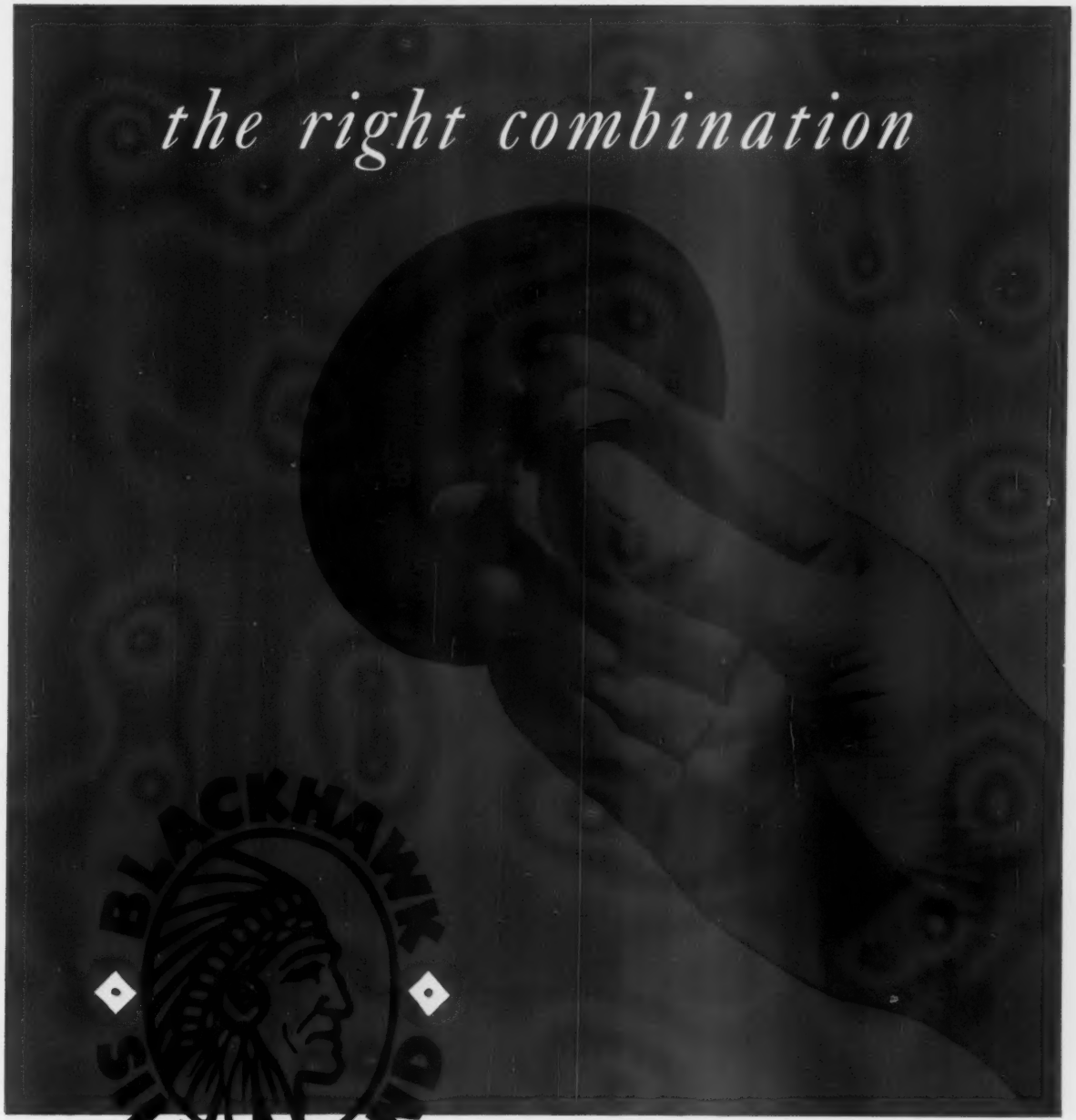
ARO®

AIR HOISTS

Also . . . Air Tools . . . Lubricating Equipment . . . Aircraft Products . . . Grease Fittings . . .

Circle 618 on Inquiry Card—Page 51

the right combination



BLACKHAWK SILICA SAND

How about your combination—the combination of ingredients so important in proper sand mixing?

Your mixing combination will always be right with BLACKHAWK foundry silica because every shipment, large or small, is always the same. Your formula starts with a known factor every time.

BLACKHAWK has excellent properties of uniformity, permeability, high sintering and high fusion points—all properties so important to the ultimate success of your foundry products.

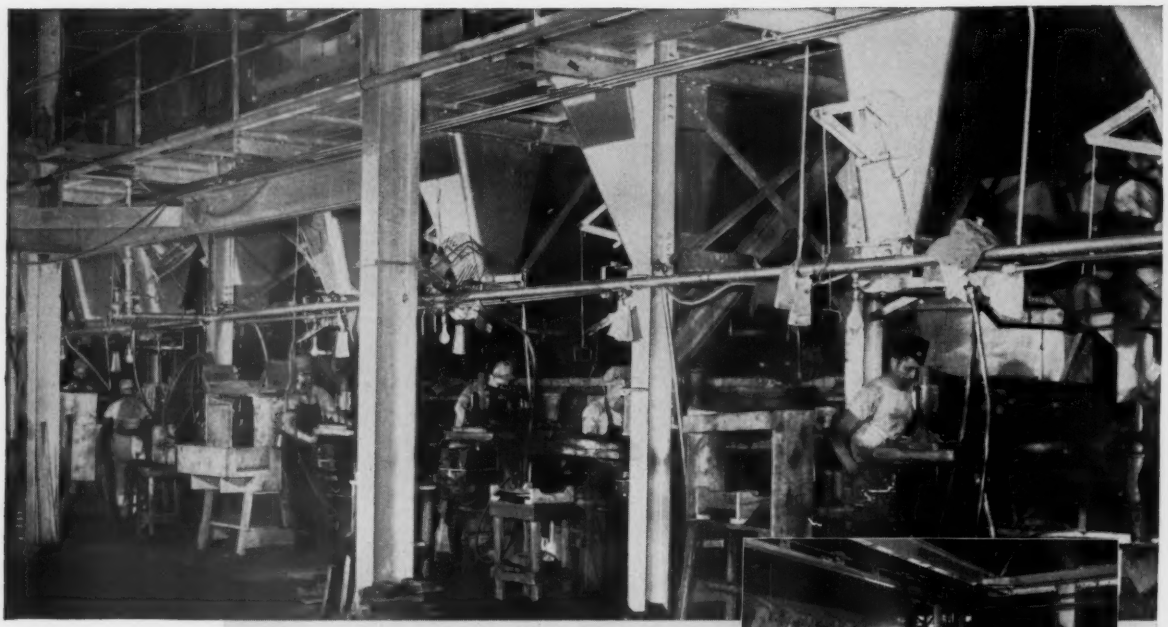
For a combination that works, include BLACKHAWK silica—from the world's finest deposits.

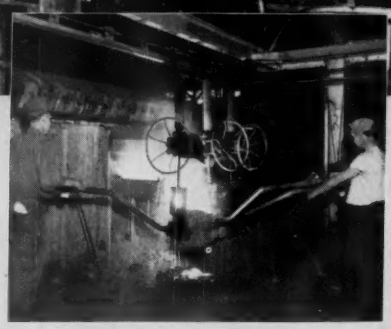
Prompt delivery assured by two of the nation's major trunk line railroads.

it costs less to use the best!

STANDARD
Silica Company
OTTAWA • ILLINOIS

Silica Center of the World





Knight services include:

Foundry Engineering
•
Architectural Engineering
•
Construction Management
•
Organization
•
Management
•
Industrial Engineering
•
Wage Incentives
•
Cost Control
•
Standard Costs
•
Flexible Budgeting
•
Production Control
•
Modernization
•
Mechanization
•
Methods
•
Materials Handling
•
Automation
•
Survey of Facilities

Knight-Engineered MODERNIZATION PROGRAM IS INSTALLED WITHOUT INTERRUPTING PLANT OPERATION—

AND RESULTS IN INCREASED OUTPUT OF 33⅓%

This successful program was put into operation—step by step—without substantial interference to existing production. Continued operations during the modernization process were made possible by careful scheduling of necessary changes.

Modernization was accomplished without an increase in floor space and resulted in improved product quality, better working conditions, and a stronger competitive position for the company.*

This plant is a good place to work.

Whatever your industrial problem, you'll benefit by the broad experience of Knight Engineers. For prompt attention, call our Chicago or New York office.

*Name supplied upon request.

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

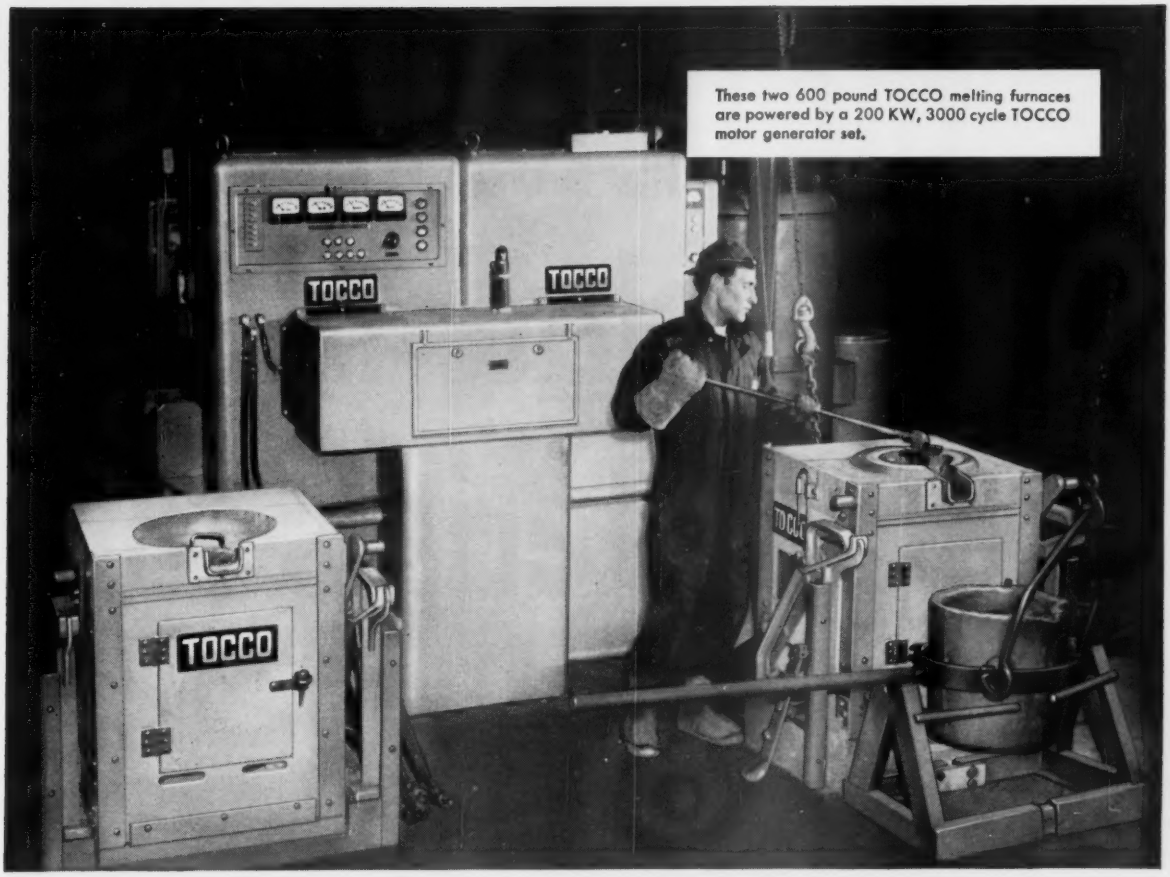
Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC,

549 W. Randolph St., Chicago 6, Ill.

917 Fifteenth St., N.W., Washington, D.C.

New York Office—Lester B. Knight & Associates, 375 Fifth Ave., New York City 16



These two 600 pound TOCCO melting furnaces are powered by a 200 KW, 3000 cycle TOCCO motor generator set.

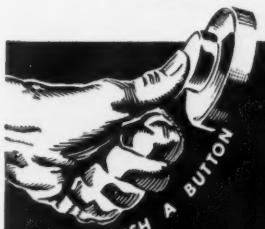
TOCCO* Induction Melting "Delivers"— In Two Days Instead of Two Months!

Casting backlogs at Commercial Shearing and Stamping Co. in Youngstown, Ohio, used to lag from 8 to 10 weeks behind production schedules. By installing four 600 pound TOCCO melting furnaces this firm upped daily melting capacity to 28,000 pounds. Now orders can be shipped in 48 to 72 hours.

In a foundry occupying less than 8000 square feet of space, production of castings jumped between 40% and 50%; tensile strength of alloy castings was boosted from 35,000 to 50,000 p.s.i. Substantial savings in the cost of castings have resulted. Moreover, with precision casting and molding on a push-button basis, many former drilling and roughing operations were completely eliminated.

Many firms have discovered that TOCCO Induction Melting insures maximum quality control, increased volume and lower operating costs—foundry premiums directly linked to TOCCO's rapid melting, simplicity of operation, low alloy loss, constant burn off and pinpoint quality control.

THE OHIO CRANKSHAFT COMPANY



TOCCO

*Trade Mark Reg. U.S. Pat. Off.

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. F-5, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State____

Now...from U.S.G.

the most complete line of materials for plastic tooling!

U.S.G. experience, technology and research set new standards for epoxy laminating and casting resins

Now, you can do the entire job—from blueprint to finished pattern or tool—with materials from a single source, United States Gypsum. The addition of new EPOXICAL Tooling Plastic to the U.S.G. family of gypsum cements and plastics completes a line of materials for laminating and casting; makes U.S.G. an important part of the plastics industry.

Now, you're assured of unit responsibility; of quality materials that have been scientifically researched, thoroughly tested. A qualified U.S.G. technician will be happy to demonstrate how these U.S.G. materials can be applied to your plastic tooling problems.

FREE! Write United States Gypsum, Dept. 122, 300 West Adams St., Chicago 6, Ill. for this free literature: HYDROCAL Models and Molds (IGL-ITT-100); Vacuum Forming with ULTRACAL (IGL-ITT-55); EPOXICAL Laminating Resin (IGL-400); EPOXICAL Casting Resin (IGL-401).

Visit the U. S. G. booth 118-120 at the First Engineered Castings Show May 6-10, Cincinnati, Ohio

UNITED STATES GYPSUM

HYDROCAL*

HYDROCAL gypsum cements are used for molds and original models to laminate or cast plastic patterns, dies, jigs, fixtures or foundry match plates and core boxes.

ULTRACAL*

ULTRACAL gypsum cements are used for vacuum forming models and molds. Offer high strength, improved heat resistance for prototype, short run and production applications.

NEW EPOXICAL*

NEW EPOXICAL tooling plastics permit laminating or casting of precise, economical epoxy resin patterns and models in half the time required by traditional techniques.

**HYDROCAL and ULTRACAL are trade marks Reg. U.S. Pat. Off. for super strength gypsum cement manufactured by United States Gypsum Company. EPOXICAL is a trade mark for epoxy resins manufactured by United States Gypsum Company.*

pioneering in ideas for industry

Circle 622 on Inquiry Card—Page 51

over 14,000 — 8,000 Different Cylinder SELECTIONS—

Miller

AIR AND HYDRAULIC

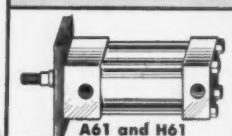
"STANDARDIZED" CYLINDERS

"IN STOCK" for immediate delivery...

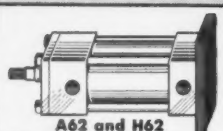
See Miller Bulletins A-105 (Air) and H-104 (Hydraulic) for Complete Dimensions and Engineering Data on these standardized "in stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 ft.

"IN-STOCK" MODELS

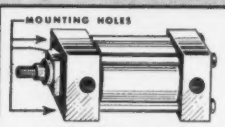
"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.



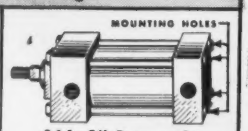
A61 and H61
Flange Mounting on Rod End
(A61 not available in 8" bore)



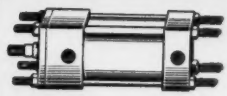
A62 and H62
Flange Mounting on Cap End
(A62 not available in 8" bore)



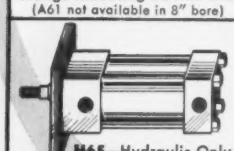
A63—8" Bore only
Flange Mounting on Rod End



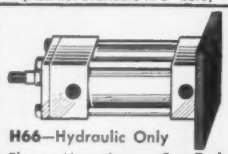
A64—8" Bore only
Flange Mounting on Cap End



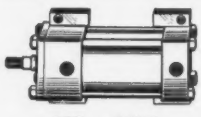
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



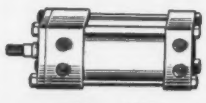
H65—Hydraulic Only
Flange Mounting on Rod End



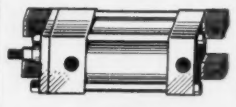
H66—Hydraulic Only
Flange Mounting on Cap End



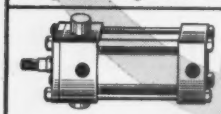
A72 and H72
Side Lug Mounting



A74 and H74
Side Flush Mounting

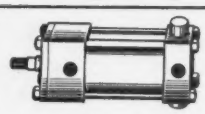


A77 and H77
Side or Foot Mounting

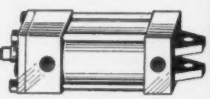


A81 and H81 Trunnion Mounting on Rod End

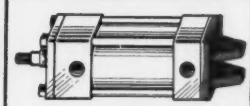
Your Choice of
CAP END CUSHIONED
ROD END CUSHIONED
or
BOTH ENDS CUSHIONED
on all cushioned strokes of all bores shown.



A82 and H82 Trunnion Mounting on Cap End



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN STOCK BORES In Inches

"IN-STOCK" STROKES (in Inches)

	BORES	ROD DIA.	ROD TURN DOWN & THREADS		STROKES
AIR	1½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12
	2	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	6	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	8	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
HYDRAULIC	1½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12
	2	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1¾"	1¼-12	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	2"	1½-12	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

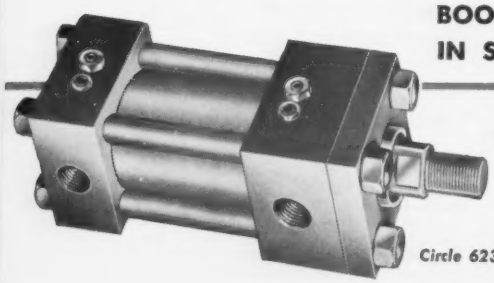
Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.



BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBAB, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

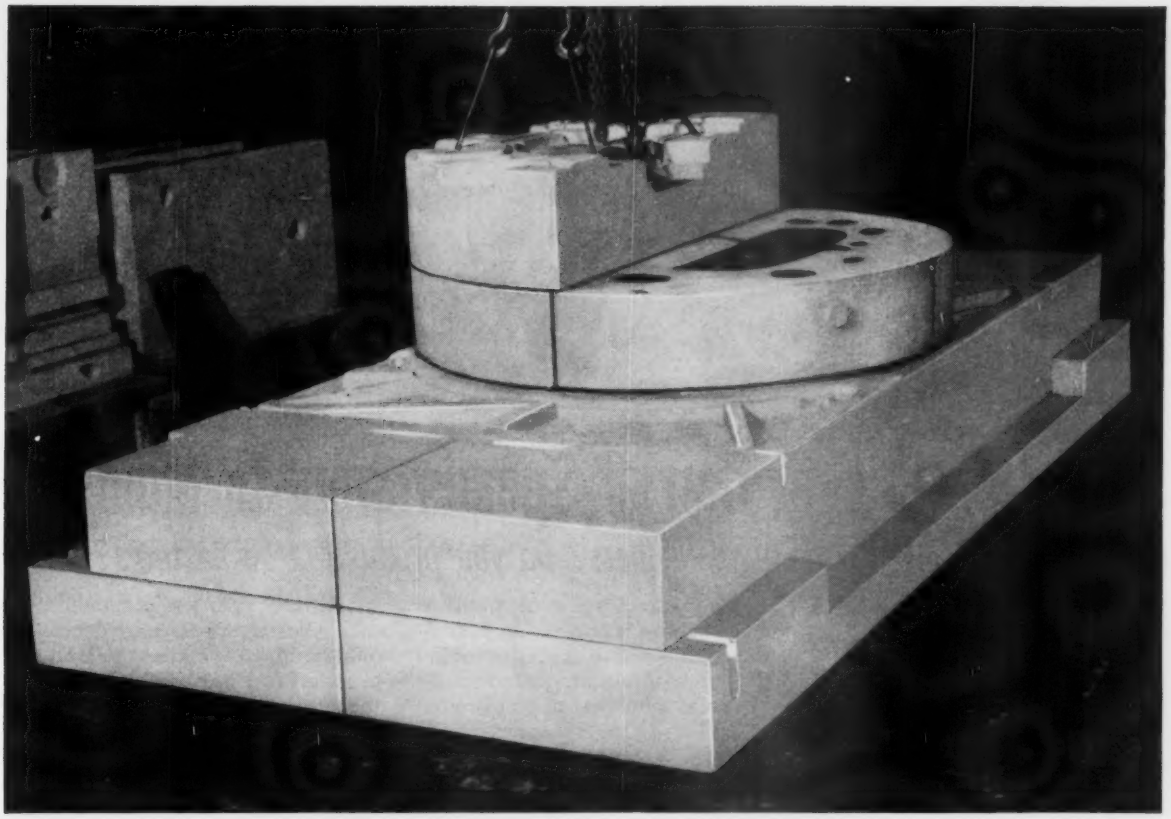
Write For Catalog and Stock Price List

Miller

FLUID POWER DIVISION
Flick-Reedy Corp
2034 N. Hawthorne Ave. — Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

Circle 623 on Inquiry Card—Page 51



How to pick the WINNING COMBINATION of Core Binders

Did you ever stop to consider that a core can go wrong in any of *twenty different ways?* Use the winning combination of such performance-proved binders as Dexocor, Mogul, Kordek and Globe Dextrines—and you'll get top performance all the way.

These famous binders have been developed to complement each other. Regardless of the size and complexity or simplicity of your casting, the metal you're running, your core making and casting facilities, there's a winning combination of binders that will give you best results . . . top quality castings, produced economically and fast.

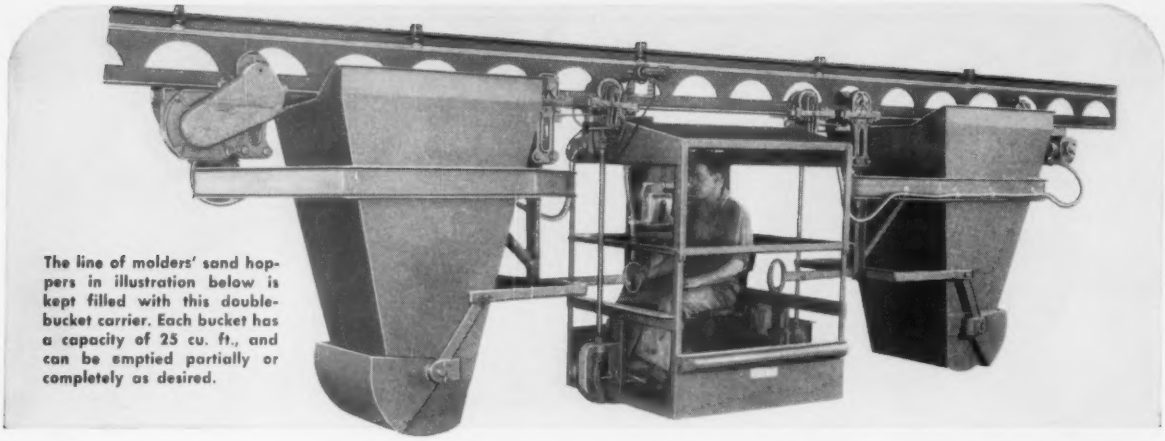
Help in formulating this winning combination to meet your specific needs is available for the asking. Experienced men on our foundry staff will gladly work with you—no cost or obligation.

WINNING COMBINATIONS

For Outstanding Performance on:	Use This Combination of Binders:
Green bond	Mogul plus Dexocor
Dry bond	Dexocor plus Kordek
Green sand	Mogul plus Dextrine or Dexocor
Dry sand	Kordek plus Dexocor
Flowability	Dextrine or Kordek
Moisture resistance	Dexocor
Collapsibility	Dexocor plus Dextrine • Kordek or Mogul
Scratch hardness	Dexocor plus Dextrine or Kordek
Reduced baking time	Dexocor
Reduced gas	Dexocor
Better blowing	Dexocor plus Mogul
Easy ramming	Dexocor plus Mogul
Simplified, cleaner mixing	Dexocor
Easy shake-out	Dexocor • Mogul • Kordek or Dextrine
Reduced veining	Dexocor
Smoother casting finish	Dexocor
Dry, easily handled	Dexocor • Mogul • Kordek or Dextrine
Less waste in handling	Dexocor • Mogul • Kordek or Dextrine
Better core paste	Kordek
Reduced costs	Dexocor plus Mogul

CORN PRODUCTS SALES COMPANY
17 Battery Place, New York 4, N. Y.

Makers of DEXOCOR® · MOGUL® · KORDEK® · GLOBE® Dextrines



The line of molders' sand hoppers in illustration below is kept filled with this double-bucket carrier. Each bucket has a capacity of 25 cu. ft., and can be emptied partially or completely as desired.

Tramrail Bucket Carrier Speeds Sand to Molders

Do you have 10 or more molders? Do you produce large castings?

Then This Carrier Offers You Important Advantages

If your foundry is of medium or large size, either using a considerable volume of core or molding sand, or requiring sand distribution to a number of points, you should look into the possibilities of a Cleveland Tramrail cab-operated bucket carrier operating on overhead trackage. Consider these advantages:

1. High speed delivery from muller to molders.
2. One Tramrail unit serves many molders.
3. Greatly reduces sand spillage and aids cleanliness.
4. Sand carried in buckets does not lose its moisture content.
5. Easily adapted to foundry layouts of all types. Not confined to straight-line layouts.
6. Long track life is assured because tracks are high carbon with raised wearing treads.
7. Equipment has very few wheels and bearings to require attention.
8. Low overall maintenance.
9. Because of ease of erection or dismantling, Tramrail Systems are easily re-arranged or extended to suit new conditions as they arise.
10. Cost of equipment and operation usually lower than for other mechanized methods.
11. Tried and proven for many years in many foundries.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3834 East 286 Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

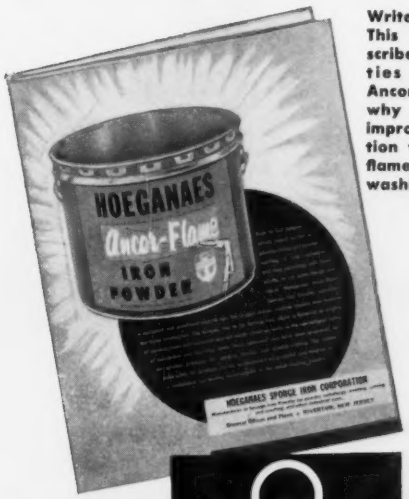
Economical powder-metal-cutting and Hoeganaes Ancor-Flame Sponge Iron Powder *go hand-in-hand*

ANCOR-FLAME IRON POWDER INTRODUCED INTO THE OXYGEN STREAM, OXIDIZES RAPIDLY — INCREASES FLAME TEMPERATURE. EASILY PERMITS FLAME-CUTS OF STAINLESS STEELS AND OXIDATION-RESISTANT METALS, just as you formerly achieved in conventional cutting of low-carbon and low-alloy steels.

Hoeganaes Ancor-Flame offers you the performance advantages of uniform flow, hotter flame, cleaner and sharper cuts, faster burn, less smoke, and less powder consumption.

The physical properties of Ancor-Flame equal or surpass the highest standards set for flame-cutting iron powders.

The Hoeganaes Specialist-Engineer can give you additional facts . . . *all the facts.* His services can help you solve metal-cutting problems.



Write for your free copy. This folder fully describes physical properties of Hoeganaes Ancor-Flame; as well as why Ancor-Flame will improve your production when it comes to flame-cutting, scarfing, washing and lancing.

Sales Representatives in Principal Cities

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BIRMINGHAM, ALA.
CHICAGO, ILL.
CINCINNATI, OHIO
CLEVELAND (FOSTORIA, OHIO)
EDMONTON (ALBERTA, CANADA)
MINNEAPOLIS, MINN.
NEW ENGLAND (ELMIRA, N. Y.)
PHILADELPHIA (RIVERTON, N. J.)
PITTSBURGH, PA.
ST. LOUIS, MO.

HOEGANAES

HOEGANAES SPONGE IRON CORPORATION

Manufacturer of sponge iron, stainless steel, and special alloy powders for powder metallurgy, cutting and scarfing, chemical field, plastic industry, atomic energy, welding electrodes, and other industrial uses.

General Offices and Plant • RIVERTON, NEW JERSEY

Circle 626 on Inquiry Card—Page 51

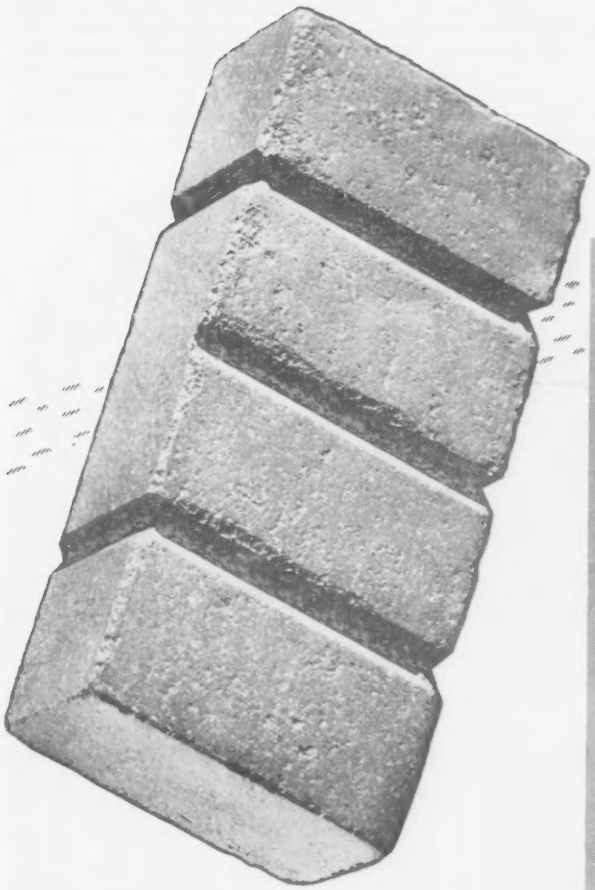
often imitated but never equalled!

A little Famous Cornell Cupola Flux, added to each cupola charge of iron, purges molten iron of impurities so that you pour clean metal every time. Furthermore, the iron is hotter and more fluid, and sulphur is greatly reduced. Many dollars are saved in cupola maintenance, too. Digging out is greatly reduced as drops are cleaner and bridging over is practically eliminated. Hundreds of leading gray iron foundries and malleable foundries with cupolas are now regular users of Famous CORNELL Flux. Be one of them, call for a representative NOW!

Write for Bulletin 46-B

Famous CORNELL CUPOLA FLUX

Pays off with the first Brick — and pays increasing dividends as long as you use it!



Have you tried Famous Cornell Aluminum Flux?

Have you tried Famous Cornell Brass Flux?

Write for Bulletin 46-A

The **CLEVELAND FLUX** *Company*

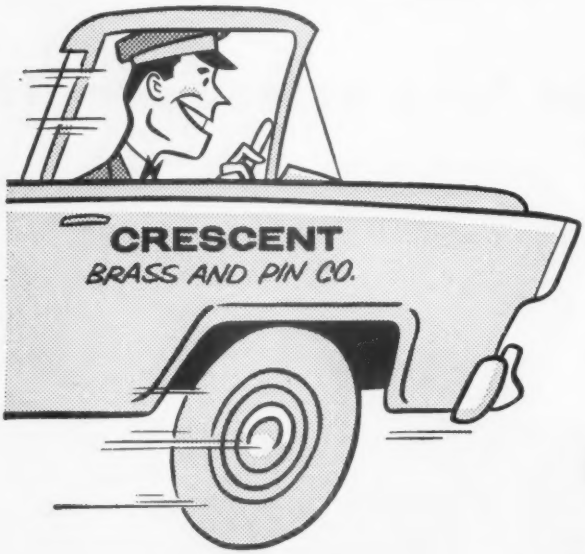
1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

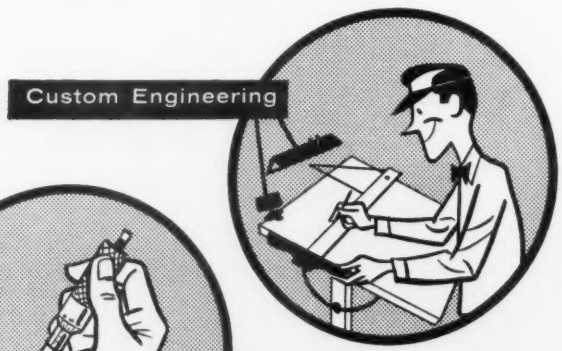
service

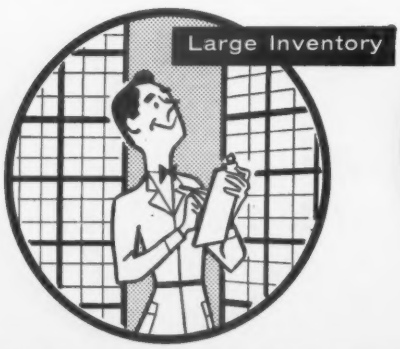


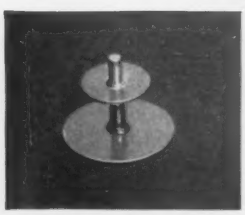
Our 67 years of serving the needs of industry have taught us that service means different things to many people. For instance, many foundry operations rely on our complete, convenient stock of chaplets. Others have come to know that our custom design facilities stand ready to answer their particular needs. And no job is too large or too small . . . chaplets are our business.

But you might say the "pay-off" for those customers has been our reputation for precision tolerances which form the foundation of every chaplet we design and manufacture.

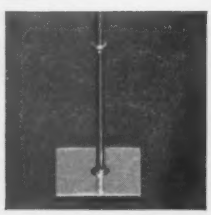
Let us prove 67 years of experience right in your own foundry. Get to know the advantages of our superior reputation, facilities and service. Your products will reflect the benefits of this superiority.



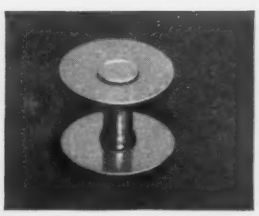




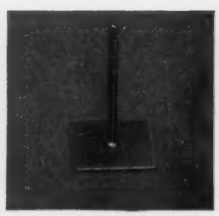
double head extended stem chaplet



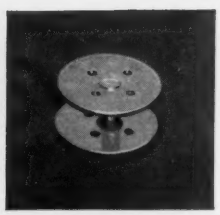
shoulder chaplet



boiler chaplet



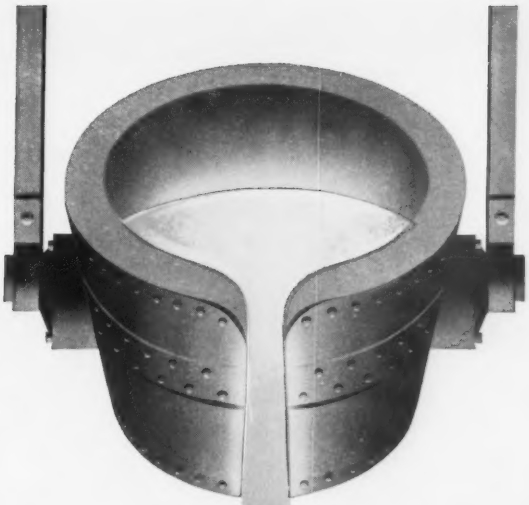
radiator chaplet



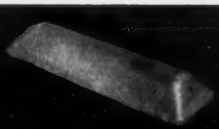
perforated double head chaplet

CRESCENT BRASS & PIN CO.

5766 Trumbull Ave., Detroit, Michigan



Quality Products for the Foundry Trade



NEVILLE
PIG IRON

NEVILLE
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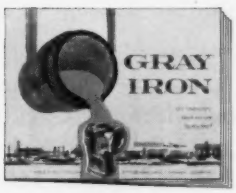
GRAY IRON BROCHURE



An illustrated brochure on the Gray Iron Industry and its place in the nation's industrial economy. Includes descriptive data on casting practices and the story of the production of Neville Pig Iron and Neville Foundry Coke.

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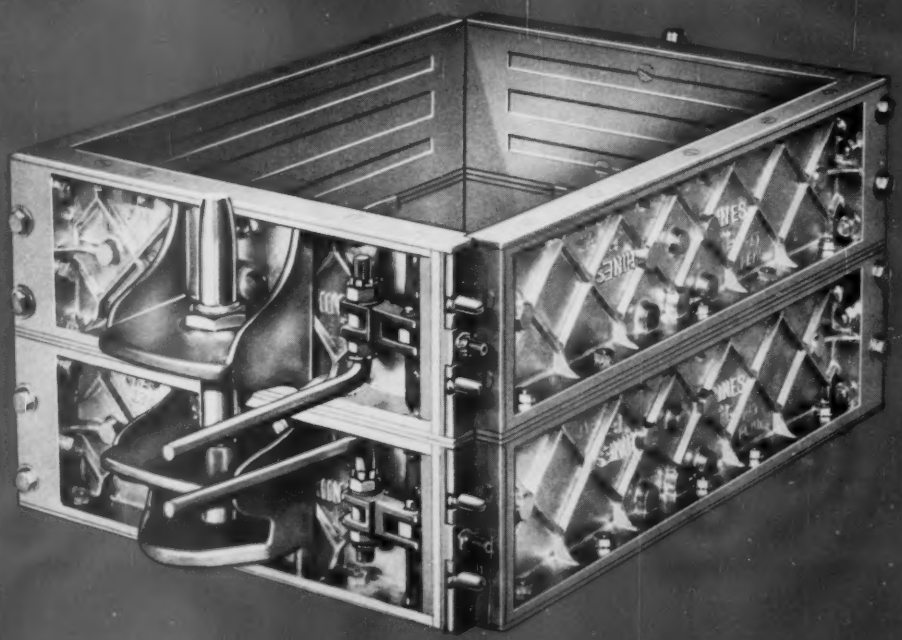
COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

HINES *straight-wall*

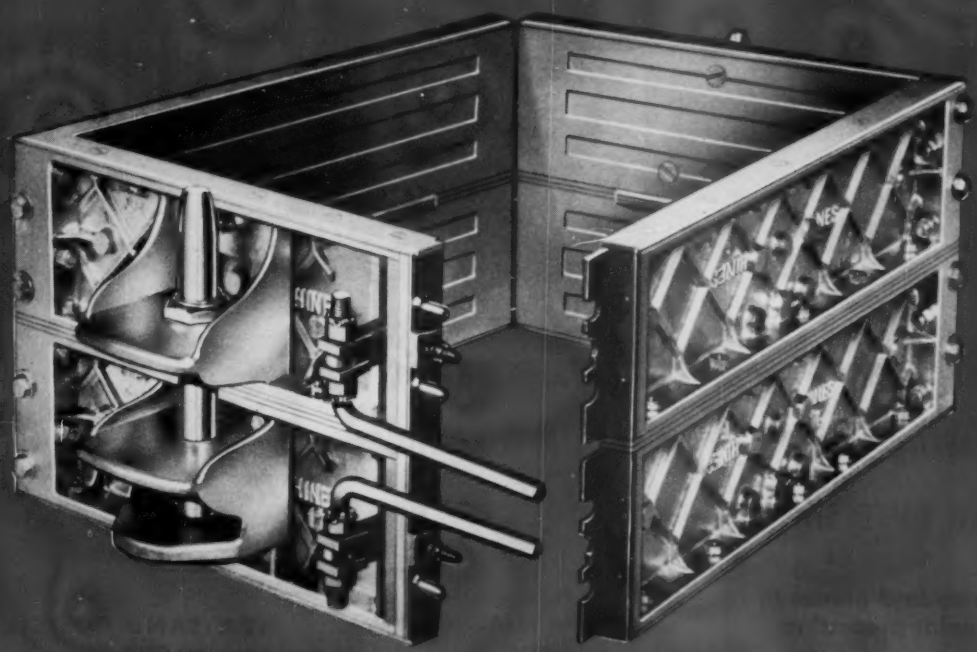


PATENTS PENDING

This new, straight-wall, Hines "HINGE-OFF" flask is recommended for hand and mechanical molding of loose, match plate and cope and drag plate patterns, up to 20″ in length. Made of light weight metal, it maintains alignment because it will not warp from absorbing moisture and drying, as in wood flasks. No wood screws to work loose! Accurate pins and guides and pin center alignment! And, it is provided with a positive, fast-acting, locking mechanism that aligns and locks the open end perfectly and rigidly, to prevent shift!

Maintenance is economical — flask can be repaired and kept in alignment at your own plant. Only one adjustment — tightening the nuts on the locking mechanism. Lengths and widths, 10″ to 20″, in even inches. Cope and drag depths, 3″ to 5½″, in half-inches. Depths over 5½″ are made up in sections. Equipped with Hines standard pins, bushings or guides.

HINGE-OFF FLASK

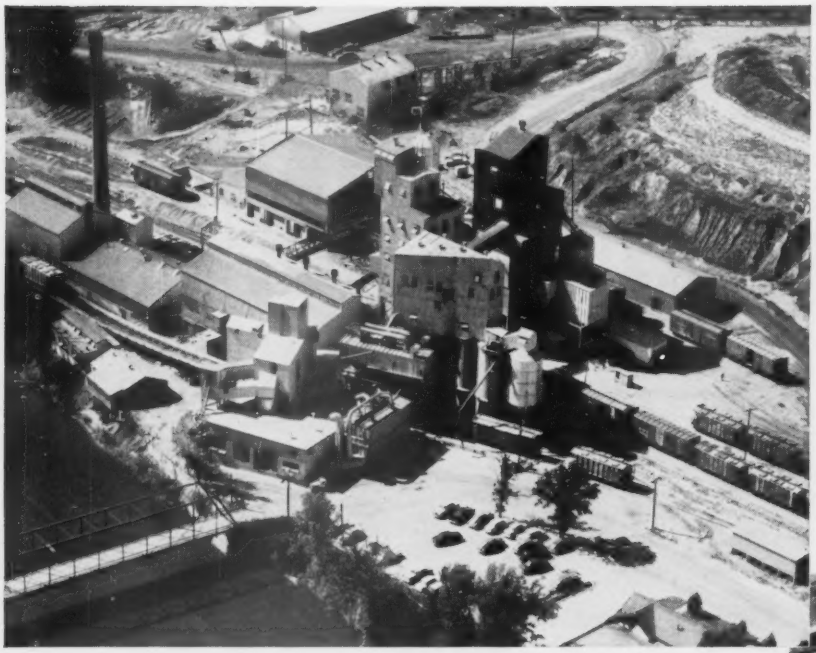


PATENTS PENDING

This new "HINGE-OFF" flask is being used in our newly developed STACK OR MULTIPLE MOLDING METHOD (Patents Pending). Contact our Main Office for working arrangements and prices.

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO



99.9% PURE SILICA
WEDRON
SILICA COMPANY
INDUSTRIAL SAND

This extensive deposit plus scientific processing assure you the finest rounded grain pure silica sand for foundry use

24 standard grades in regular production

The chances are better than ever that your foundry operations now require high quality, more exact sand grades than they used to. With the new casting methods now used, sand is critical. It has to be pure, uniform and of a certain exact grade.

This close control of sand quality is only possible in a scientific sand processing plant such as Wedron's. Every step in the process is controlled to give users consistently high quality sand with these facilities. Wedron regularly produces 24 separate grades of sand as standard. From these grades it is possible for most users to choose a sand which will meet most any requirement. Where necessary, Wedron can produce special sand grades to customer specifications. A considerable amount of our regular production is in these special grades.

The Wedron sand deposit itself has special plus values for foundry users. Wedron sand is a pure, rounded grain silica with high heat and chemical resistance. It is highly desirable for foundries because it greatly reduces cutting out of core boxes and produces a smoother casting surface, grade for grade.

In many ways, Wedron is your best bet for foundry sand. Make your next order Wedron . . . for the best foundry sand available.

NEW SAND BOOKLET

This new booklet gives all the details on Wedron Sands for all kinds of industrial uses. Complete descriptive folder details the Wedron processing operations which produce the finest rounded grain silica sands. 24 separate standard grades are tabulated and chemical analysis of sand is given. Numerous illustrations of the Wedron plant and facilities are shown. Send for your copy today!

WEDRON

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT

WEDRON SILICA COMPANY

135 South LaSalle Street, Chicago 3, Illinois

Circle 631 on Inquiry Card—Page 51

TISCO®

REPLACEMENT BLADES to fit WHEELABRATORS*

LAST 6 TIMES LONGER

TISCO Replacement Blade — Manufacturers part numbers 36473 and 154069.

TISCO Replacement Blade — Manufacturers part numbers 47130 and 143600.

TISCO 150-Y Blades for Wheelabrators* are now harder, thicker and have a smoother wearing surface. Combined, these factors guarantee a blade which lasts six times longer than competitive blades.

TISCO 150-Y High Chrome Alloy was developed especially for extreme abrasion. Close metallurgical control and rigid heat treating standards offer a superior blade which will keep your down time to a minimum.

TISCO blades are ground to accurate dimensions for easy replacement and precision balanced in sets to insure smooth, troublefree operation. You, too, can realize lower costs in your cleaning operations through the use of TISCO 150-Y blades. Why not contact us for more information?

*Reg. U. S. Pat. off. by American Wheelabrator & Equipment Corp.

TAYLOR-WHARTON CO.

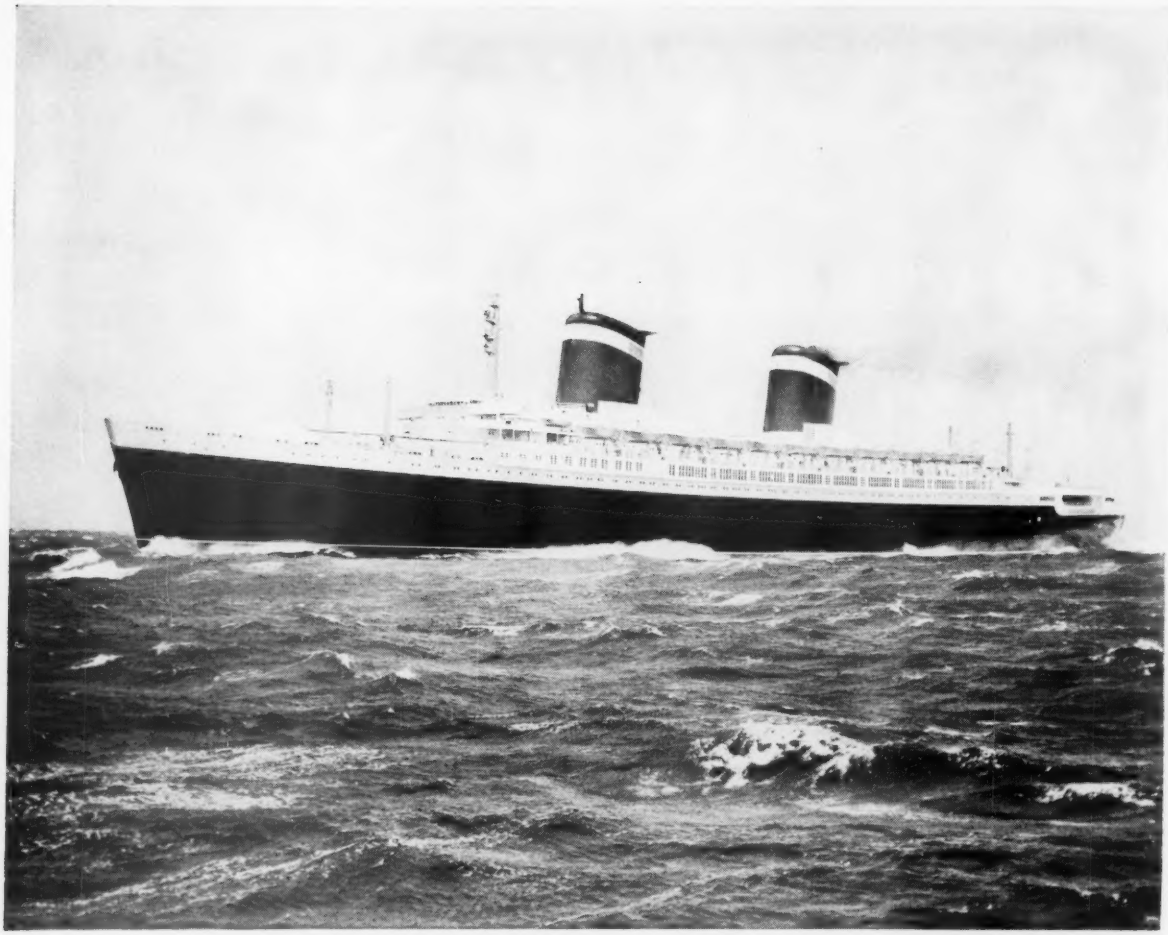
DIVISION OF HARSCO CORPORATION

Established 1742

HIGH BRIDGE 7, NEW JERSEY

PLANTS: Cincinnati, O. — Birmingham, Ala. — Easton, Pa.

SALES OFFICES: New York — Chicago — Milwaukee — San Francisco



OCEAN SUPERLINER—Modern passenger vessels like this help America maintain its maritime supremacy. Castings are an integral part of the engines that power these ocean giants.

TRULINE® BINDER MEANS SMOOTH SAILING FOR FOUNDRIES

Finished castings flow smoothly from your foundry and costly production delays are avoided when you use Truline Binder. No matter what production problems your foundry faces, you can count on Truline to help solve them. Cores molded with Truline are strong, collapse readily, and are easily removed by knockout or hydroblast.

Fast-baking Truline Binder eliminates oven bottlenecks, and minimizes repairs and welding that add to final casting costs. In the core room, in the molds, and in the cleaning room Truline Binder improves efficiency, reduces man-hours per ton. For information on how Truline Binder can mean increased production at lower cost, write:

HERCULES

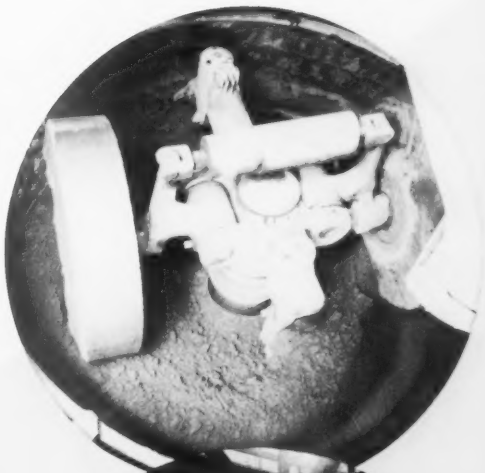
Pine Chemicals Division, Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
920 King Street, Wilmington 99, Del.

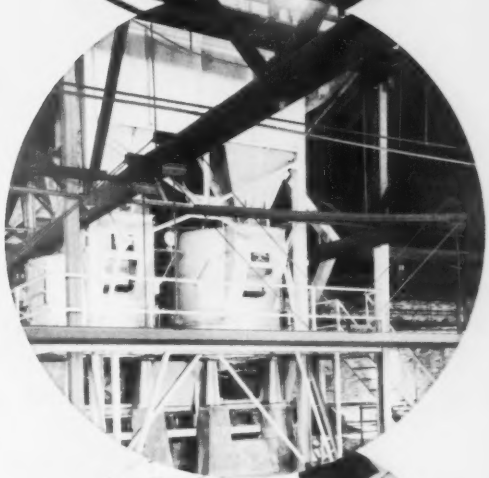
NF57-1

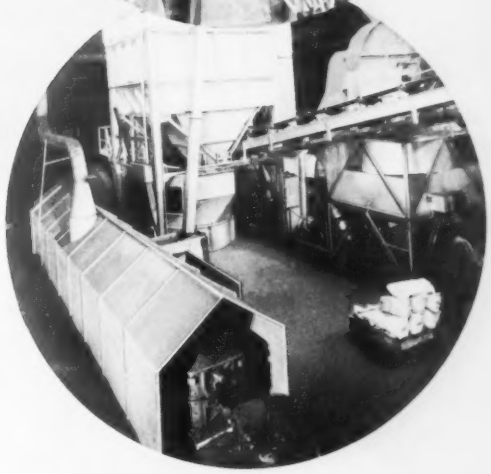
Circle 633 on Inquiry Card—Page 51

Circle 634 on Inquiry Card—Page 51→

This is NATIONAL Engineering Company







SAND PREPARATION

SAND HANDLING

FOUNDRY ENGINEERING

...PRODUCTS OF A PRACTICAL FOUNDRYMAN

THE FOUNDRY INDUSTRY IS OUR BUSINESS

For half a century National Engineering Company has devoted its activities to the planning, development and manufacture of foundry equipment designed to help you make better, more salable castings.

Modern day sand practices saw their beginning with the advent of *mulling* foundry sand—made possible by the introduction of the Simpson Mix-Muller. Since then, the Mix-Muller has played an important part in today's widespread use of synthetic sands and the continuing development of resin bonded sands.

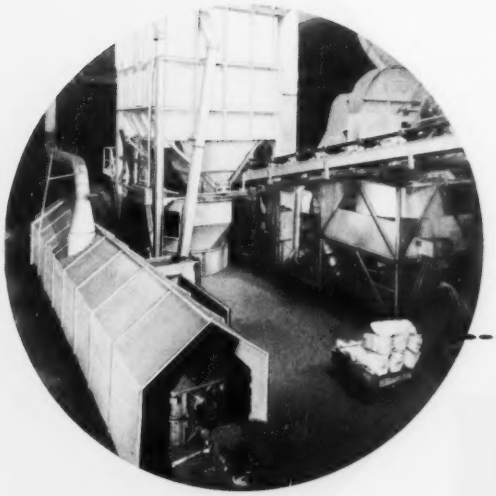
National sand and mold handling equipment has made similar contributions towards the improvement of casting quality, lowered handling costs and better environmental conditions in the foundry.

The production and sale of castings has become as important a part of our business as it is of *your* business. And this is the reason why National Equipment, whether it be a Simpson Mix-Muller or a complete sand handling system, is conceived, built and regarded by National—as a *machine* to produce castings.

NATIONAL

ENGINEERS

FOR FOUNDRIES



Practical foundry experience . . . which permits competent appraisal of the problem at hand is the foundation upon which every National engineered job is built. It is a complete service because experience has proven that the similarity of one foundry to another ends at the front door.

Here is a broad outline of how National coordinated planning, engineering and manufacturing services are utilized by the industry:

COORDINATED PLANNING SERVICE

This professional planning service draws on our extensive background in equipment design and manufacturing to offer competent and authoritative consultation on various phases of foundry planning and engineering. Staffed to handle design, layout, equipment and construction of *entire* foundry operation.

SAND HANDLING

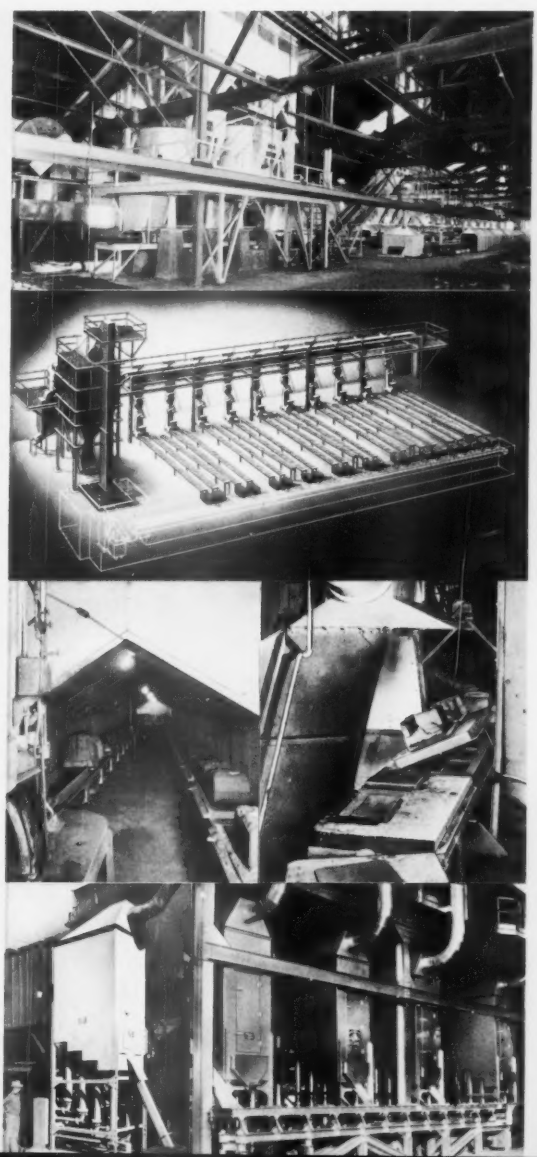
The National service begins with a thorough analysis of your requirements, which can often be met by simple, well-integrated equipment items. This service offers the user the benefit of many exclusive, National-patented features — designed to provide long life and low maintenance for National Sand Systems.

MOLD HANDLING

National builds a variety of car, pallet and track type conveyors for integration into mold handling systems of National design. Shown at right are some of the features included.

SAND RECLAIMING SYSTEM

The National Sand Reclaimer has been quickly accepted by users throughout the country as the first means for the average foundry to *profitably* reclaim sand. A recent study of savings realized by six average users showed these units were turning in total savings of $30,000 *per month*. Many other users are experiencing savings similar to these. Equipment is often amortized in less than a year. Contact your National agent for details.



NATIONAL

BUILDS THE SIMPSON *MIX-MULLER*

Thousands of foundrymen endorse, by ownership, the *true mulling principle* of the Simpson Mix-Muller. These basic features appeal to foundrymen because they provide more mulling per dollar invested, per ton of sand prepared:

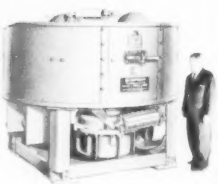
SIMPLICITY of design provides low maintenance and longer life.

WIDE FACE MULLERS mull *more* sand with every revolution.

SPRING LOADED mullers provide needed versatility . . . the *right* pressure for the right sand.

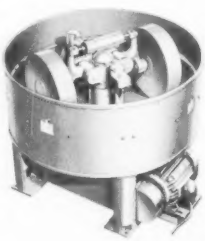
INTENSIVE smearing kneading action coats *every* grain.

3F MIX-MULLER



The 3F Mix-Muller will produce more sand per hour, per batch and in *fewer* batches per hour than any muller available for foundry use. Maintenance of two 3F Mix-Mullers cost Elyria Foundry Division *one cent* per ton of sand prepared, in 3½ years of 16 hr. a day usage.

2F MIX-MULLER

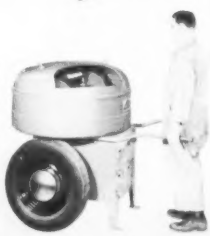


In 1950 a 2F Mix-Muller *eliminated* 20 man hours of work per day for Emmaus Foundry Co. The same mixer now turns in 16 hrs. a day on molding sand and a *week's requirement* for dry shell sand on Saturday. Fourteen 2F Mix-Mullers produce *all* core sand for two of the auto industry's largest foundries.

1½F MIX-MULLER

Low operating and maintenance costs insure the utility of this medium size Mix-Muller for use in medium size shops with *growing* sand requirements. Savings in bond and other additives more than pay for your investment in more and *better* sand for molding, facing, core or shell sand requirements.

SIMPSON PORTO-MULLER



Any foundry has a job for the Porto-Muller. With it, you can mix *any* sand, *anywhere* in your shop. It's 100% self contained. You just plug it in — and *start* mulling. It is ideal for shell sand — for preparing facing or for taking the "load" from production mixing equipment. Many shops use the Porto-Muller for *all* their sand requirements.

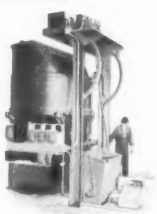
LF MIX-MULLER

The LF "Lab Mill" *duplicates* production mulling. It's a *professional* tool that can help you develop better, smoother and more salable castings through laboratory control — without sacrificing shop production time for experimentation.

NATIONAL AERATORS

National Aerators are designed for direct attachment to mixer discharge or can be furnished for use anywhere in the sand system. They provide free-flowing, lump-free sand at the molder's station, eliminate most riddling and, by their gentle combing, fluffing action, actually improve the molding quality of the sand!

NATIONAL BUCKET LOADERS



You can cut operator time *in half* with a National Bucket Loader for your Mix-Muller! You eliminate over and undercharge and do away with laborious manual charging of the mixer. You can save up to 50% in sand preparing time.

NATIONAL TIMEMASTER

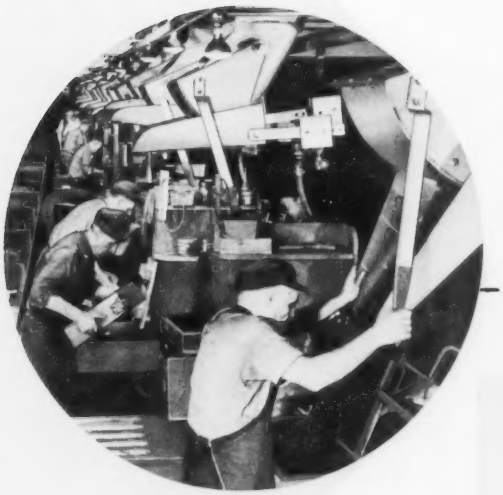
Timemaster saves you man hours! By providing full automatic control over the mixing cycle it can eliminate guesswork — take the "human element" out of batch composition and save you time and money in sand preparation and sand handling.

NATIONAL

BUILDS

SAND HANDLING EQUIPMENT

The "growth" problem of smaller and medium sized foundries can be met on an economical, yet progressively practical basis with standardized "packaged" units such as shown below. The National services encompass all phases of foundry mechanization—from a simple off-the-floor molding arrangement to a complete foundry sand preparing and handling system.



MOLDERS HELPER

Bring overhead sand to the smallest operation at low cost! *Eliminate* shoveling and sand hauling. Molder's Helper is charged either by front end loader or can be attached to *any* production size Simpson Mix-Muller. You get *aeration*, *elevating* and *storage* of sand for one to four molding stations.

SHELL MULL

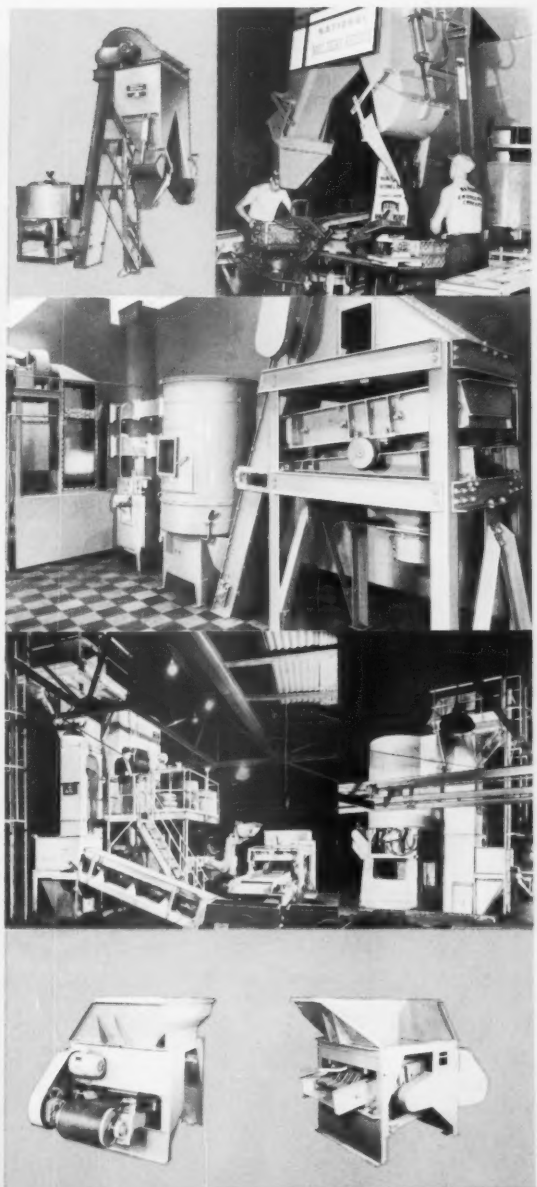
Provides completely coated, high tensile, free flowing, lump-free shell sand. This fully integrated shell sand preparing plant includes: heater, Mix-Muller, dust collector, elevator, aeration and screen. In use in over 30 foundries, including *every* principal auto manufacturer in the U.S.

UTILITY UNIT

An expandable sand preparing unit designed to increase output at welcome savings in time — *without* major mechanization and need for large capital investment. Includes sand castings hopper for front end loader, screening, conveying and magnetic separation equipment; bucket elevator; mixer with dust hood and aerator.

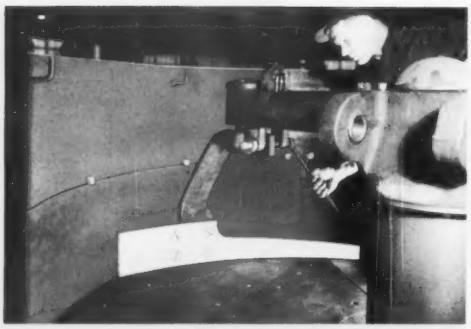
SCREEN MASTER

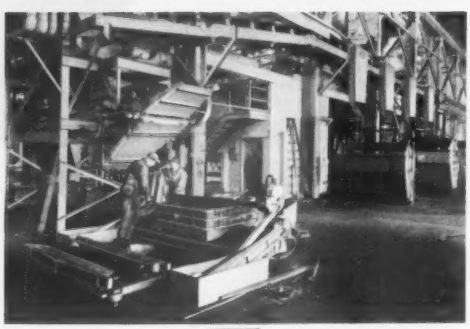
Compact, easy to use screening unit which requires no pits or foundations. Provides clean, uniform and lump-free sand for rebonding. Easily incorporated into existing installations. Includes hopper, magnetic belt conveyor, motors and starters.



NATIONAL

CALLS ON THE INDUSTRY, DAILY, WITH . . .





REPAIR PARTS

If you operate a Simpson Mix-Muller all records pertaining to that equipment are kept on permanent file in our Repair Department. This is a good point to remember *before* you buy a *used* Simpson — call us for any information pertinent to its history and condition of repair. When ordering spare, or repair parts, please furnish us with both the part number (from your parts list) and serial number of the mixer.

PERFORMANCE LABORATORY

As a service to you, National now offers complete sand testing and laboratory facilities. Use of our SHELL-MULL equipment and laboratory size Mix-Mullers can be made available. Arrangements for documented testing of your sand formulas for mulling or reclamation characteristics, are invited.

SERVICE

Several full time service crews are maintained by National. These men spend all of their working hours in foundries. They *know* National equipment and how to work with foundry maintenance people. Their services are available wherever National equipment is used.

NATIONAL FIELD SERVICE

Your "Man from National" is a specialist in the integration of foundry mixing equipment. He draws on a background of National experience that has been directed towards new, better and faster means of producing castings for almost 50 years. His knowledge of and experience with, foundry equipment and practices is one of National Engineering Company's most valuable assets.

NATIONAL ENGINEERING COMPANY

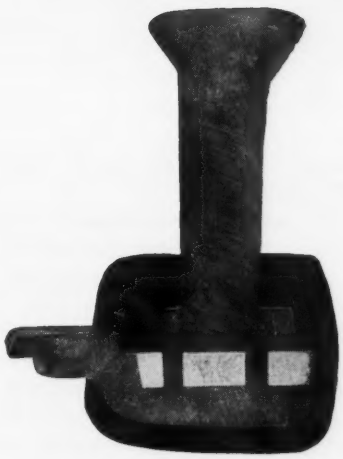
549 Machinery Hall, Chicago 6, Illinois

50M-457-SF

Printed in U.S.A

MORE and MORE foundries are cutting production costs with LOUTHAN STRAINER CORES

It will pay you to find out WHY!



It is no accident that more and more foundries are turning to *Louthan Strainer Cores* as a means of upping production, cutting labor costs. They *try* them, find that they *do* improve operations—through cutting scrap losses in castings and reducing "rework" costs.

Louthan Refractory Cores keep slag and sand-core inclusions out of castings, and permit closer control of the molten metal. They withstand 3000°F. temperatures without spalling or disintegrating. You'll also find them exceptionally uniform, dimensionally accurate, easy to handle, simple and economical to use.

To help you make comparative tests in your plant, under normal production conditions, we now have *core prints* of our standard strainer cores which can be easily attached to your patterns. We'll be happy to *give* you these and a reasonable quantity of the matching strainer cores. Simply tell us your sprue diameter (or ingate size) and we'll send them to you. Your only obligation is to *try* them and judge the results for yourself!

Louthan **REFRACTORY STRAINER CORES**

WRITE FOR **FREE SAMPLES** AND MATCHING CORE PRINTS

Louthan Mfg. Co., East Liverpool, Ohio (Subsidiary of FERRO® Corporation)

REPRESENTATIVES: M. A. BELL COMPANY, St. Louis 2, Mo. . . Houston 3, Texas; **FOUNDRY SUPPLY COMPANY,** Minneapolis 16, Minn.; **MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee 46, Wisc. . . **FREDERIC B. STEVENS INC.,** Detroit 16, Mich. . . Indianapolis 7, Ind. . . Buffalo, N. Y.; **MISSOURI REFRACTORIES COMPANY,** 4599 Pacific Blvd., Los Angeles 58, California

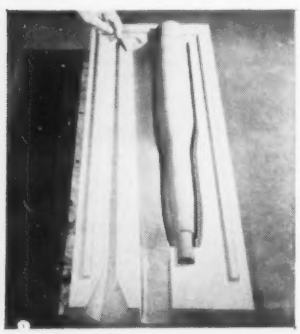
Coremaker cures larger core with portable CO_2 unit, using 50-lb. pressure. Cores are firm, easy to handle.

Cured cores ready to be taken to the metal pouring lines. Specially prepared core sand feeds through chute (left). Sand is hand-tamped into molds. Then CO_2 from jet (center) is shot into molds.

"New sodium silicate-CO_2 process cut our coremaking cost 21% and improved core quality"

—says HANS JACOB, Foundry Supt., Lehigh, Inc., Easton, Pa.

Intricate cores (above) and large cores and molds (below) are economically made and cured in only 2 to 3 minutes. Because no stockpiling of cores is necessary, core room runs as an integral part of the pouring line.



"Since we began using the sodium silicate-CO_2 process, coremaking has been much more efficient and economical," continues Mr. Jacob. "Pasting and mudding costs have been eliminated, and an over-all saving of 21% has been achieved. Hot tears and cracks, and 'lost' tolerances have been decreased, too. And the men in the shop like the new technique because it has no objectionable gases or fumes.

"Production is faster with the sodium silicate-CO_2 process. Most cores are used the same day they are cured," Mr. Jacob concludes.

High-quality Du Pont sodium silicate is available in formulated products for CO_2 systems from foundry supply houses throughout the country.

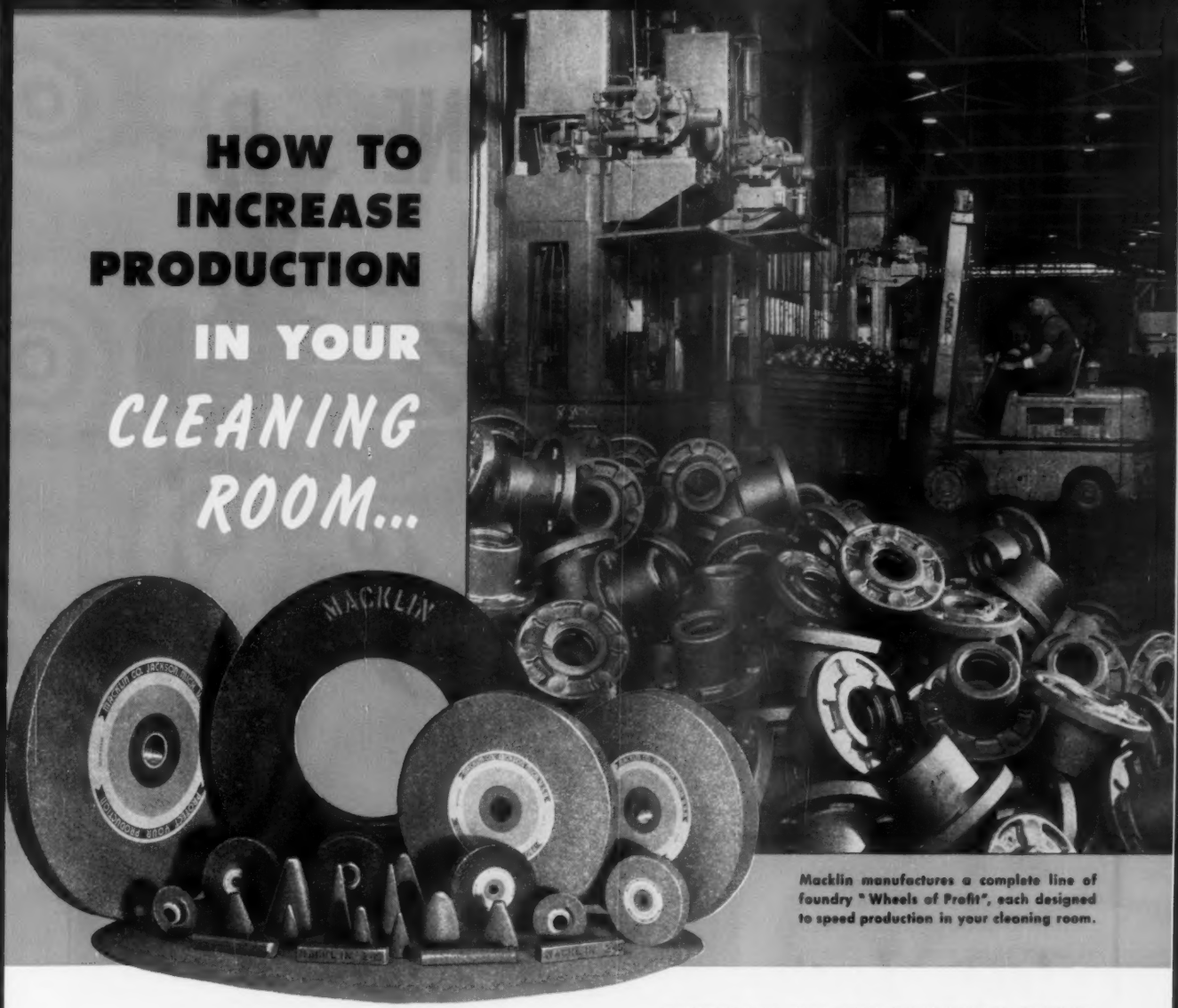
If you're thinking of adapting the new sodium silicate-CO_2 process to your operation, contact your foundry supply distributor. Or write to Du Pont for names of supply houses that are equipped to provide technical assistance along with their formulated products.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Grasselli Chemicals Department, Room N-2533, Wilmington 98, Delaware

DU PONT REG. U. S. PAT. OFF **SODIUM SILICATE**

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

HOW TO INCREASE PRODUCTION IN YOUR *CLEANING ROOM...*



Macklin manufactures a complete line of foundry "Wheels of Profit", each designed to speed production in your cleaning room.

Don't let your cleaning room be a bottle neck to expanded foundry production! Specify Macklin Foundry Wheels with the improved B-5 bond. Tests prove the B-5 gives up to 30% longer wheel life. It cuts faster and the wheels stay sharp with a minimum of dressing.

HERE'S PROOF OF PERFORMANCE—

OPERATION: Stainless and high-speed steel billets and ingots. (Swing frame, 20 x 2½ x 6")

	Wheel Life	Stock Removal
Macklin	13¾ hrs.	330 lbs.
Wheel A	14 hrs.	220 lbs.

OPERATION: Malleable castings. (Floor stand, 20 x 2 x 10")

	Wheel Life	Stock Ground Over the Wheel
Macklin	24 hrs.	17 tons
Wheel B	18 hrs.	11 tons

OPERATION: 3% Titanium Steel Billets. (Swing frame, 16x2x6")

	Stock Removal
Macklin	36 lbs. per hr.
Wheel C	18 lbs. per hr.

OPERATION: Gray Iron Castings. (Portable, 6/4 x 2 x ⅜")

	Wheel Life
Macklin	17-20 hrs.
Wheel S	12-15 hrs.

Circle 637 on Inquiry Card—Page 51

CHECK-UP ON THE GRINDING WHEEL PERFORMANCE IN YOUR FOUNDRY

- **Is the rate of production up to your top requirements?**
- **Are wheels removing the proper amount of metal in relation to the amount of wheel used?**
- **Do wheels stay sharp and hold proper contour?**

YOUR MACKLIN FIELD ENGINEER WILL BE GLAD TO HELP YOU GET THE RIGHT ANSWERS TO THESE QUESTIONS. **To arrange for an on-the-job demonstration, *without obligation*, write today!**

MACKLIN company

Dept. 22, Jackson, Michigan

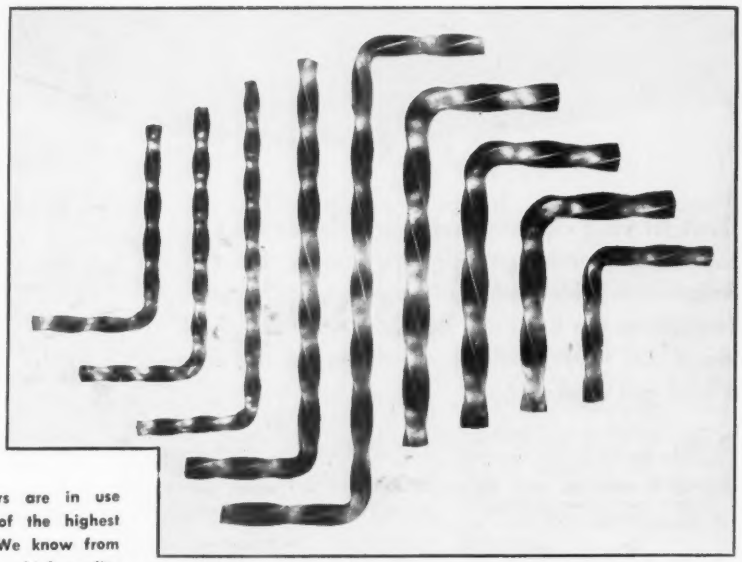
STOCK CORE MACHINE

Here is a practical and economical unit for making perfect stock cores—the "RAPID" CORE MACHINE. Properly mixed core sand falls into the throat of the machine and is forced through a brass tube by a screw conveyor. Formed core is automatically vented. Hand operated or motor-driven, it saves time and money. Capacity 3/8" to 3".

- ★ Eliminates costly core boxes!
- ★ Reduces Core Room bench labor!
- ★ Does away with core parting line!
- ★ Allows for shrinkage — saves metal and machine work!
- ★ Can produce special shapes in wide range of sizes!

Soft Steel GAGGERS are your best investment!

Longer Lasting
Surer Grip
Lower Cost



WADSWORTH Square Twisted Soft Steel Gaggers are in use throughout the United States. Soft prime steel of the highest quality is used to make WADSWORTH Gaggers. We know from years of experience that it is more economical to use high quality soft prime steel as intermediate steels, without a certified analysis, fracture at the bend. After a heat or two this inferior quality gagger becomes hard and brittle breaking at the fracture.

WADSWORTH Equipment Company produces gaggers of many shapes and sizes, varying 3/8", 1/2", 5/8" in thickness, tailored to YOUR specific needs, and at costs so reasonable that there is little reason for you to ever be short of adequate supply.

WADSWORTH
EQUIPMENT COMPANY
Box 6122 Ellet Station, Akron 12, Ohio. ST-4-4411

GET OUR PRICE TODAY ←

FOUNDRY RESEARCH

includes Lectromelt* Furnaces when building for the future

RECOGNIZING the importance of the electric arc furnace to the modern iron and steel foundry, research laboratories now include them for help in developing methods and solving metal problems. The two Lectromelt Furnaces shown above are in such a foundry—small enough to expedite experiments, big enough to simulate production runs.

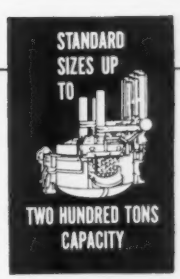
Lectromelt Furnaces give the exact control of heat and analyses needed to make today's engineered castings. With metallurgical research finding more and more uses for special alloy castings, specifications are tougher, yet a good foundry with a Lectromelt Furnace can meet these rigid requirements.

Our engineers will answer your questions covering all sizes of furnaces. Catalog No. 9-A describes them. For a copy, write Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd St., Pittsburgh 30, Pennsylvania.

Manufactured in...GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg...ENGLAND: Electric Furnace Co., Ltd., Weybridge...FRANCE: Stein et Roubaix, Paris...BELGIUM: S.A. Stein & Roubaix, Bressoux-Liege...SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genova . . . JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF

WHEN YOU MELT... Lectromelt



TWO VALUABLE AIDS TO FOUNDRY EFFICIENCY

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

AND ECONOMY...

Republic Metallurgical Service, Plus All Grades of Merchant Pig Irons

It's a rare instance when a foundry does not profit by a visit from the man who knows his irons—the Republic Pig Iron Metallurgist.

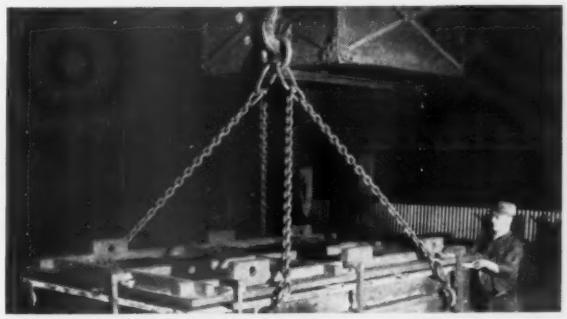
He is frequently called upon to make a routine survey to determine whether a foundry is operating at peak efficiency. His recommendations and suggestions often result in improved operations, increased production efficiency, and output at lower unit casting-cost. There have been numerous cases where a seemingly minor change in operation or procedure has resulted in recapturing business lost to other methods of fabrication.

The Republic Pig Iron Metallurgist is both foundryman and skilled technician. He has a solid background gained from years of actual foundry experience. He talks a language you can understand. He knows all types of irons and their characteristics. Information on the latest techniques, processes, and controls available for improving castings, and expanding their use and sale, is at his fingertips.

This welcome visitor to foundries of all sizes is backed by Republic Steel, the only producer of all grades of merchant pig iron. This fact enables him to recommend the proper grade of pig iron for your specific job without hesitation or prejudice.

Why not call in the Republic Pig Iron Metallurgist the next time you need practical or technical foundry advice? There's no cost or obligation for his services. The coupon will let us know when you would like him to call.

ECONOMY at every stage of production, from handling to shipping, is being enjoyed by users of Republic Materials Handling Equipment. One company, using the PB-120T Box and Skid Units shown above, cut handling costs 25%, reduced inventory time, freed valuable floor space for production equipment. Republic Materials Handling Engineers will help you design equipment to meet your specific needs. Mail the coupon for more facts.



EFFICIENT HANDLING of heavy castings is provided by Republic Chain Slings. Each sling is designed, tested, and warranted for the highest degree of safety. Republic Chain Slings are made to your requirements in alloy steel, high test steel or wrought iron. Fittings and accessories are given the same precision processing as the chain itself. Our new catalog, Adv-719, contains complete information on types, care, storage, ordering, etc. Write for your copy.

VALUABLE DIES, patterns, tools and other heavy items can be stored safely on Republic Wedge-Lock Steel Shelving. It is specifically designed for high stacking of enormous weights. Joints get tighter and stronger as weight is increased. There's no sagging, swaying or buckling. Wedge-Lock is the answer to maximum loading in minimum floor space. It assembles quickly and easily and is completely flexible to meet changing requirements. Write for more information.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-3868
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☐ Have a Pig Iron Metallurgist call.
Send more information on:
☐ Materials Handling Equipment ☐ Chain Slings
☐ Wedge-Lock Steel Shelving

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

LET'S LOOK at

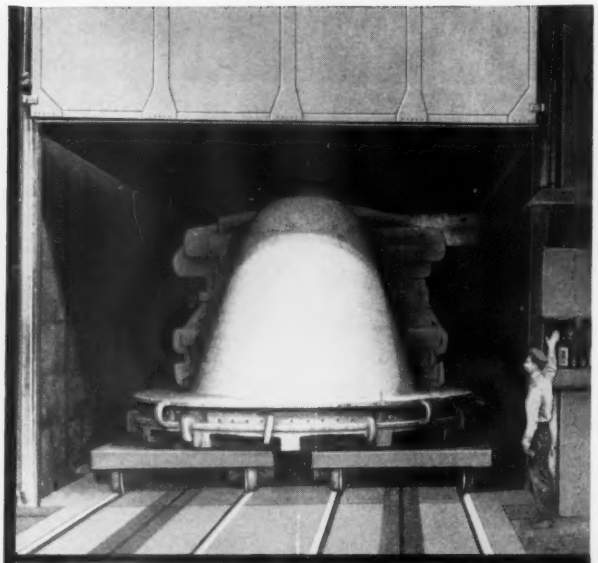
OVENS for every baking requirement

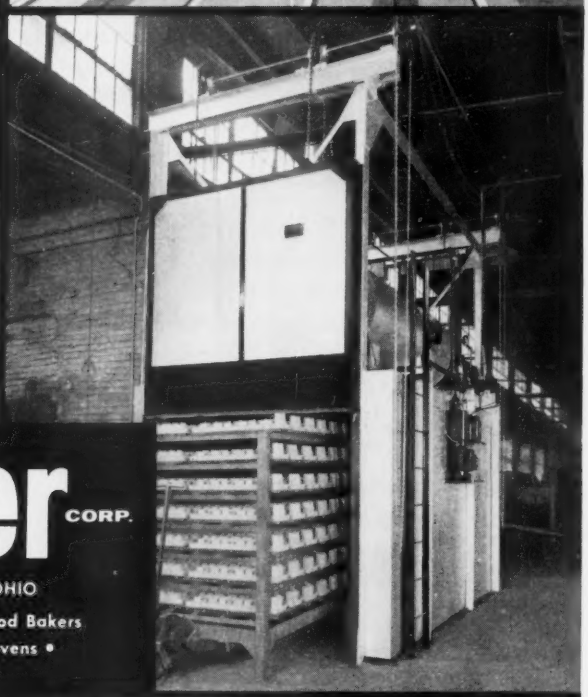
OVENS that will be faster and less expensive to operate

OVENS that are designed to best fit your operation

Carl Mayer designs and manufactures all types of ovens as well as "specials" to meet unusual operating conditions. Most incorporate the Carl Mayer recirculating heating system with sealed combustion chamber that keeps gases from prematurely escaping into the load area. Cores and molds are baked evenly with no burning. Temperatures are always under control.

Write for Bulletin 53-CM





TOP RIGHT—This large car type mold oven is installed at Pittsburgh Steel Foundry. Its special triple slotted panel construction reduces heat loss 1/3. Fuel savings up to 50% over old conventional methods are possible. Drying time is often cut in half and temperatures are uniformly controlled.

MIDDLE RIGHT—This rack type core baking oven is at the Fremont Foundry Co., Fremont, Ohio. It is equipped with a recirculating combination gas-oil fired heating system.

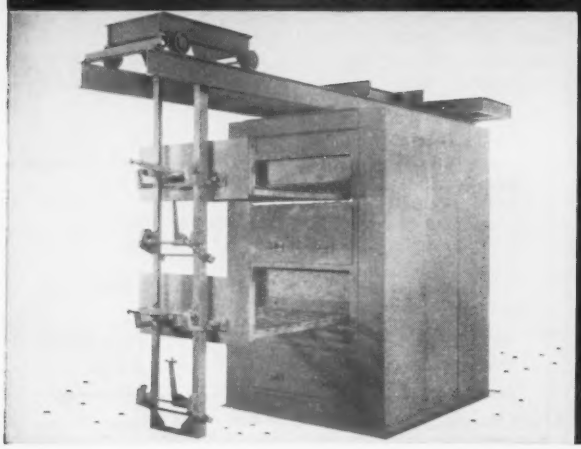
BOTTOM RIGHT—Vertical Core Oven (unloading position) at A. C. Williams Company, Ravenna, Ohio. This oven is 11'-0" wide x 11'-0" deep x 45'-0" high.

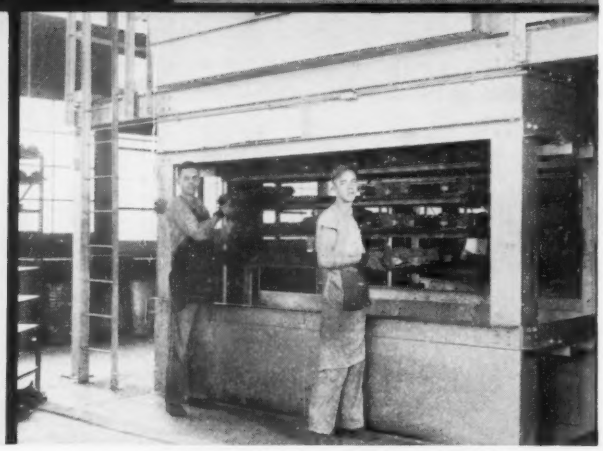
BELOW—Our standard rolling drawer type core baking oven. The heating equipment (not shown) may be mounted on floor beside unit or on the roof. Particularly adaptable to brass and aluminum foundries.

THE **carl mayer** CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

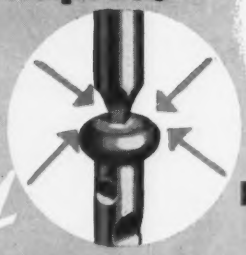
OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories





Only fine FANNER shoulder radiator chaplets

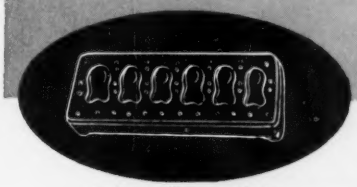
have the exclusive



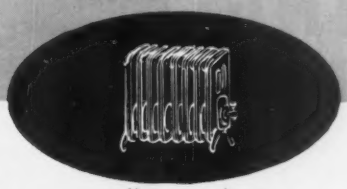
4 way break-off nick

to improve production... save money

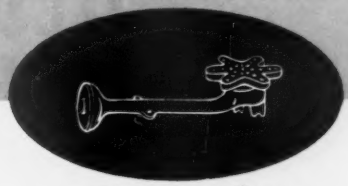
IDEALLY SUITED FOR



automotive castings



radiator castings



stove parts castings

EXCLUSIVE New 4-WAY BREAKOFF NICK

Provides maximum support during pouring, yet stem breaks off easily in any direction so that the few remaining after shake-out can be easily brushed off with no apparent surface marks remaining.

STAGGERED KNITTING NICKS

Provides better type of surface for knitting with molten metal, assuring thorough fusion and resulting in clean, solid castings.

STURDY SHOULDER AND SOLID RIVETED HEAD

Shoulder is designed and placed to permit chaplet to be set into pattern required distance without guesswork. Solid riveted head exactly at right angles to stem to insure that chaplet is always perfectly "true".

For better quality castings, for time and money savings in production use fine FANNER radiator chaplets. The exclusive four way break-off nick plus their other features speeds production of cleaner, sounder castings and reduces labor costs.

The development of the 4 way break-off nick is one more example of Fanner's constant study and engineering based on more than 60 years of experience in foundry practice.

Fine FANNER Radiator Chaplets are particularly suited for light pressure castings such as gas burners, radiator sections, manifolds and others. They are designed for use with the side of the greatest bearing surface against the green sand and will support approximately 5 pounds per square inch load.

Get complete information on FANNER Radiator Chaplets with the "4 way break-off nick" and other fine FANNER chaplets by writing for the FANNER Chaplet catalog today!

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

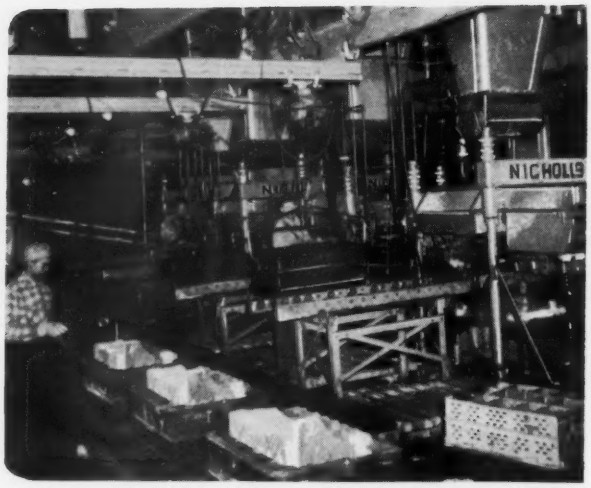
BROOKSIDE PARK • CLEVELAND 9, OHIO

WHAT'S YOUR NEED IN

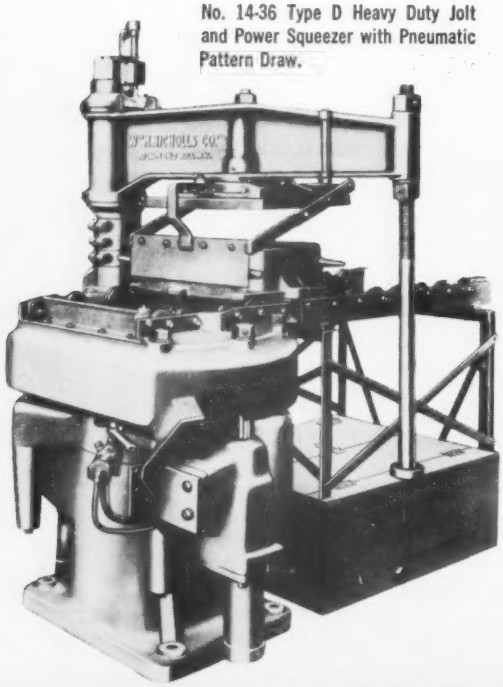
Whatever *your* requirements there's a

NICHOLLS

MOLDING MACHINE to fit the job!



A battery of Nicholls "push-button" molding machines in a large foundry.



No. 14-36 Type D Heavy Duty Jolt and Power Squeezer with Pneumatic Pattern Draw.

Want ECONOMY?

Minimum working parts, dirtproof housings, forced lubrication **lower maintenance costs.**

Want EFFICIENCY?

Simple operation, safety devices that eliminate dangerous risks and costly mistakes, precision engineering **save materials . . . increase production.**

Want AUTOMATION?

Push-button operation, automatic air-to-air control save manhours . . . **guarantee uniform high-quality molds.**

You can always depend on Nicholls for consistently better molds . . . for a continuous flow of molds . . . for major savings in time and costs which years of experience and scientific know-how make possible. Write, wire, phone TODAY for bulletins, specifications and prices . . . better still, tell us your problems.

WM. H. NICHOLLS CO., INC.
Richmond Hill 18, Long Island, N. Y.
VIrginia 9-0064

NICHOLLS

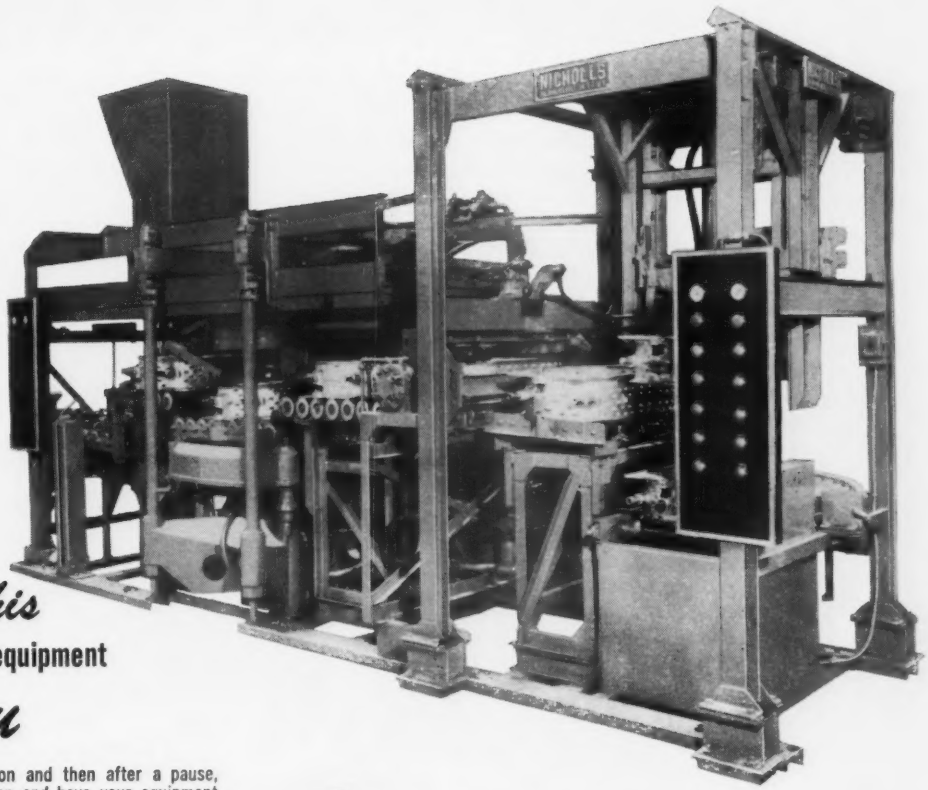
MOLDING EQUIPMENT ?

LARGE OR SMALL? MANUAL OR AUTOMATIC?

CHECK THESE FEATURES

- Built-in flask, roll-in roll-out device
- Measuring sand hopper
- Flask feed-in elevator
- Flask indexing device
- Sand spill upset
- Mold turnover and transfer
- Air-operated car-type squeeze head
- Pneumatic pattern draw

That's why Nicholls molding equipment is preferred by leading manufacturers.



No. 21 Type C Airomatic Automatic Drag Molding Unit with push-button controls — no limit switches, no electrical timers, no electric pressure switches, no electrical latch relays to get out of order.

Compare this with your **present equipment**

Can you

1. Push your "Stop" button and then after a pause, push your "Start" button and have your equipment continue with the next phase?
2. Push your "Stop" button and then after pushing several "Manual" buttons for subsequent phases, push the "Start" button and have your equipment continue automatically with the next phase?
3. Use a particular "Manual" button to pinch-hit in an emergency for a failed automatic phase in finishing out a molding shift?
4. Get 240 molds per hour (one every 15 seconds) hour after hour, shift after shift, day after day?

You can **with a**

NICHOLLS Airomatic!

• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT

Circle 643 on Inquiry Card—Page 51

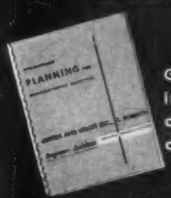
Special Processing?

Materials Handling?

Looking for the Answer to a Tough Production Problem...

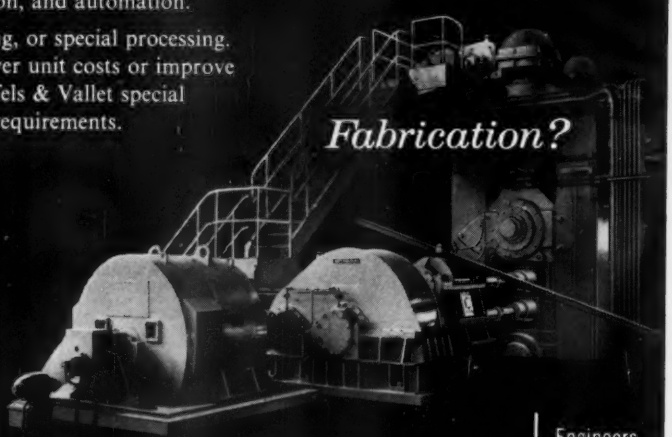
Frequently, the design of special machines will provide the answer. Helping management resolve production problems through the application of automated equipment is one of the important services offered by the Giffels & Vallet organization. This machine design service reflects years of extensive experience gained through the planning and engineering of production facilities for companies of widely diversified activity, in every area of industry. These practical insights have proved of great value in analyzing and applying solutions to problems involving special machines, mechanization, and automation.

Fabrication, assembly, materials handling, or special processing. Wherever you must increase output, lower unit costs or improve product quality—the application of Giffels & Vallet special machine design services will meet your requirements.



G & V services are discussed in a special Planning Brochure. A copy will be mailed on request.

Fabrication?



Assembly?

INDUSTRIAL ENGINEERING DIVISION

Giffels & Vallet inc.

DETROIT 26, MICHIGAN New York and Houston

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Engineers Serving Industry for Over Thirty Years

Plant Layout • Process Development • Automation Engineering • Materials Handling • Machine Design • Building Design

CO_2 hardened cores and molds get extra refractory protection with

MEXICAN VV FLAKE

To meet the growing demands of foundries which need a good mold and core wash well suited to the carbon dioxide mold-core hardening process—The United States Graphite Company has pioneered and developed MEXICAN® VV Flake ("volatile vehicle"). This new mold and core wash comes in paste form and is completely compatible with isopropyl alcohol, oleum spirits, kerosene, or similar agents. Mixed with isopropyl alcohol as its thinner, it can be easily "lit off" to promote faster drying. Suitable for application by spraying or dipping, MEXICAN VV Flake provides excellent protection and peel for molds and cores . . . bringing to foundries which utilize the CO_2 technique, a new high in production and casting quality; and greater refractory protection for molds and cores. Use of MEXICAN VV Flake with isopropyl alcohol improves the skin hardness and allows molds and cores to be stored for longer periods of time without deteriorating. Comes in 55 gallon drums.

for further information on MEXICAN VV Flake or other quality MEXICAN products, write:

235

THE UNITED STATES GRAPHITE COMPANY

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GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

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Here's why VCA can supply your foundry alloy needs better!

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VANADIUM CORPORATION DISTRIBUTORS also have stocks of Vancoram Products for the iron foundry for immediate delivery.

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Producers of alloys, metals and chemicals

Visit us at AFS Engineered Castings Congress, May 6-10, Hotel Sinton, Cincinnati, Ohio

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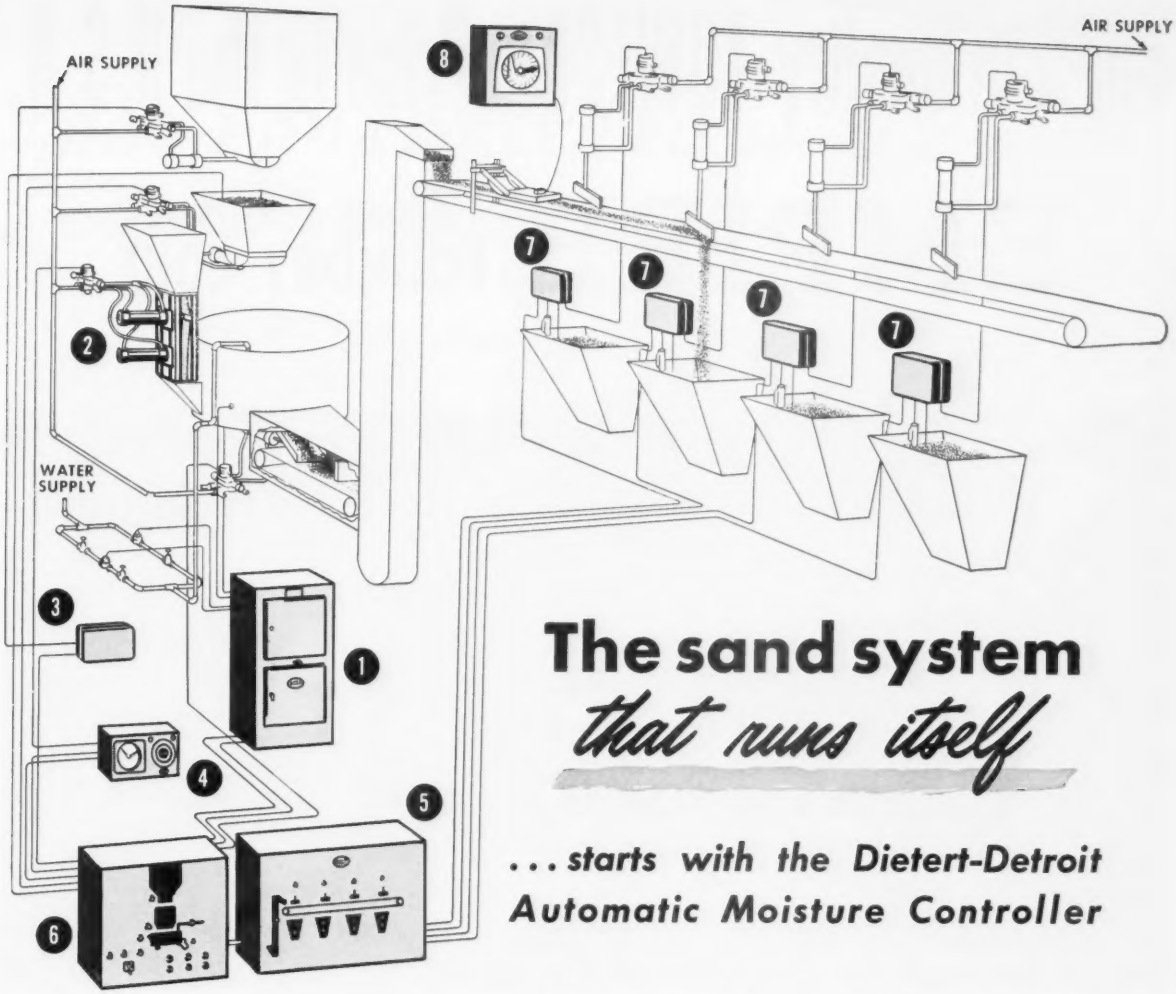

The sand system *that runs itself*

... starts with the Dietert-Detroit Automatic Moisture Controller

Completely equipped with

DIETERT-DETROIT CONTROLS

1. **END POINT AUTOMATIC MOISTURE CONTROLLER** (**No. 3907**) assures highly accurate moisture control through continuous measurement during mixing cycle.
2. **BONDADDER** (**No. 3888**) automatically measures correct amount of dry materials and discharges to muller.
3. **RETURN-SAND HOPPERTROL** (**No 3897**) automatically controls level of return sand in hoppers, bins, etc.
4. **BONDADDER IMPULSE UNIT** automatically extends each measurement cycle of the Bondadder to any desired quantity of dry material.
5. **SAND MONITOR** (**No. 3883**) automatically coordinates sand mulling and distribution.
6. **AUTOMULL** (**No. 3884**) mechanically supervises and controls complete mixing cycle.
7. **TEMPERED SAND HOPPERTROL** (**No. 3911**) automatically controls level of tempered sand in hoppers, bins, etc.
8. **MOIST RECORDER** (**No. 3887**) tests and records moisture content of sand traveling on conveyor (as shown) or in bin or hopper.

Eliminate guesswork. Cut scrap losses. Boost production. A Dietert-Detroit controlled system will do 99% of the work *itself*, 99% of the thinking *itself*. Now is the time to modernize your foundry and watch your profits climb. Modern sand control will enable you to consistently produce top quality castings . . . on schedule . . . and without that old-fashioned watching, worrying and wondering! Send coupon now for details.

BOOTH 413-AFS Castings Congress

HARRY W. DIETERT CO.

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Send me details on the following:—

☐ Dietert-Detroit Automatic Moisture Controller

☐ Complete Automatic Sand System

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

TOPS in Quality-LOWEST in Price in the U.S.A.

EMPIRE* "That Good" FOUNDRY COKE

EMPIRE has long been recognized by the foundry trade as a coke of *outstanding quality* and *consistently uniform analysis*. It is manufactured from a blend of the finest coking coals, under careful laboratory controls, by modern mechanical equipment and under supervision of specialists in coke production. Uniformly high in carbon, low in ash and sulphur, it can be used interchangeably with any other coke of comparable high quality.

EMPIRE is *substantially and consistently lower in price* f.o.b. shipping point at Holt, Ala., than top quality foundry coke produced in other sections. This lower price is possible because our coal mines and coke plant are in close proximity, with nominal transportation cost on inbound coking coal.

SECURITY OF SUPPLY—DEPENDABILITY OF SERVICE

Our Company takes pride in the fact that it has always maintained a record of *uninterrupted service to all customers*. Our own coal properties contain sufficient reserves to insure dependable deliveries for many years to come. Our coke plant at Holt, Ala., and modern Empire Coal Operations at DeBardeleben, Ala., are near the geographic center of the South. They are served by several major railroads and the navigable Warrior-Tombigbee River System.

We invite inquiries from foundries requiring a quality coke, backed by unmatched dependability of service through the years.

*Registered U.S. Pat. Off

DEBARDELEBEN COAL CORPORATION
Birmingham 3, Alabama

SALES OFFICES
2201
FIRST AVENUE NO.

Circle 648 on Inquiry Card—Page 51

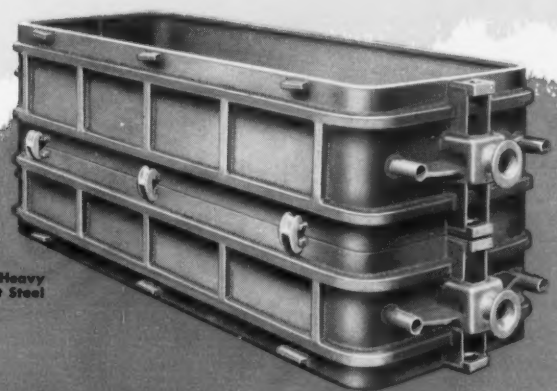
Circle 649 on Inquiry Card—Page 51→

Take it from me . . .

13,000 FOUNDRIES *all over the world . . .* can't be wrong!

IN ALL sections of the world . . . wherever there are foundries . . . you will find high-quality castings produced with Sterling Rolled Steel Flasks. More than 13,000 foundries use Sterlings for greater efficiency, longer life and more profitable foundry operation. And they continue to specify Sterlings whenever more flasks are needed.

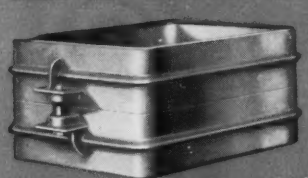
Sterling Flasks have the strength and rigidity to resist distortion and to take hard, everyday punishment. They are fabricated from special hot rolled steel channel, having a tensile strength of 70,000 p.s.i. and with controlled carbon content and copper bearing. That's why they retain their rigidity and accuracy over a long period of years. Available in a variety of styles and shapes. Write for Sterling Catalog No. 69A.



Style 3/8ND-RTX Heavy Duty Flask with Cast Steel Trunnions.

Style "LS" Flask with Angle Reinforcement and Two-Man Lift Handles.

Style "E" Flask with Pin Lugs and Handles Combined.



Sterling

WORLD WIDE SERVICE

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Main Office and Plant • Milwaukee 14, Wis., U. S. A.
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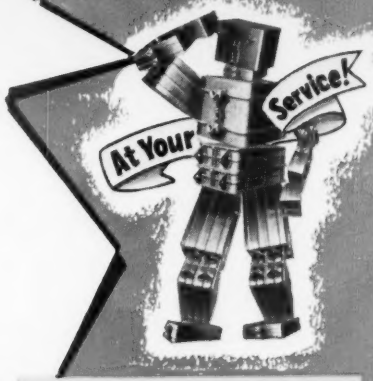
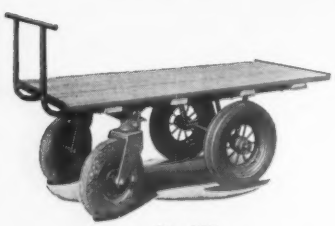
It pays to Specify

Sterling

FOUNDRY EQUIPMENT



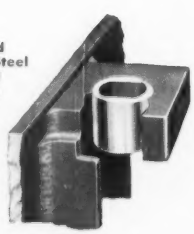
THE same manufacturer that produces special Rolled Steel Channel Flasks also manufactures the complete line of foundry equipment listed here. Foundrymen know, if the equipment comes from Sterling, it's soundly engineered and built to highest quality standards. They find it pays to specify Sterling products. So check the list for your current requirements. We'll gladly send you literature and prices.



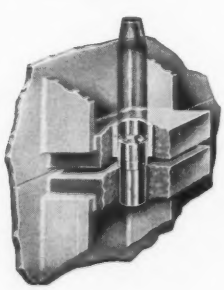
No. 110
Core Truck

No. DF4-S
Heavy Duty
Wheelbarrow

Style X
Core Plate



Standard
Hardened Steel
Ground
Bushing



Stub Pin
Shift-proof

THE STERLING LINE:

- ☐ Standard Flasks
- ☐ Heavy Duty Flasks
- ☐ Stack Molding Flasks
- ☐ Steel Flask Bars
- ☐ Flask Clamps
- ☐ Clamping Bars
- ☐ Pins and Bushings
- ☐ Steel Core Plates
- ☐ Bottom Boards
- ☐ Squeeze-in Boards
- ☐ Bands
- ☐ Upsets
- ☐ Slag Buggies
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Manufacturers of Foundry Equipment for Almost Half a Century!

WHEREVER METALS ARE CAST . . . FOUNDRY
May 1957

Sell More Castings

A great change is taking place in the foundry industry which should influence considerably its future growth and development. After many years when management's attention was directed chiefly toward production and its multiplicity of problems, a new interest is developing. Many foundrymen are beginning to realize that the successful operation of a business requires intelligent selling as well as sound production methods. Consequently, the marketing of castings has become a high-ranking activity in many foundries.

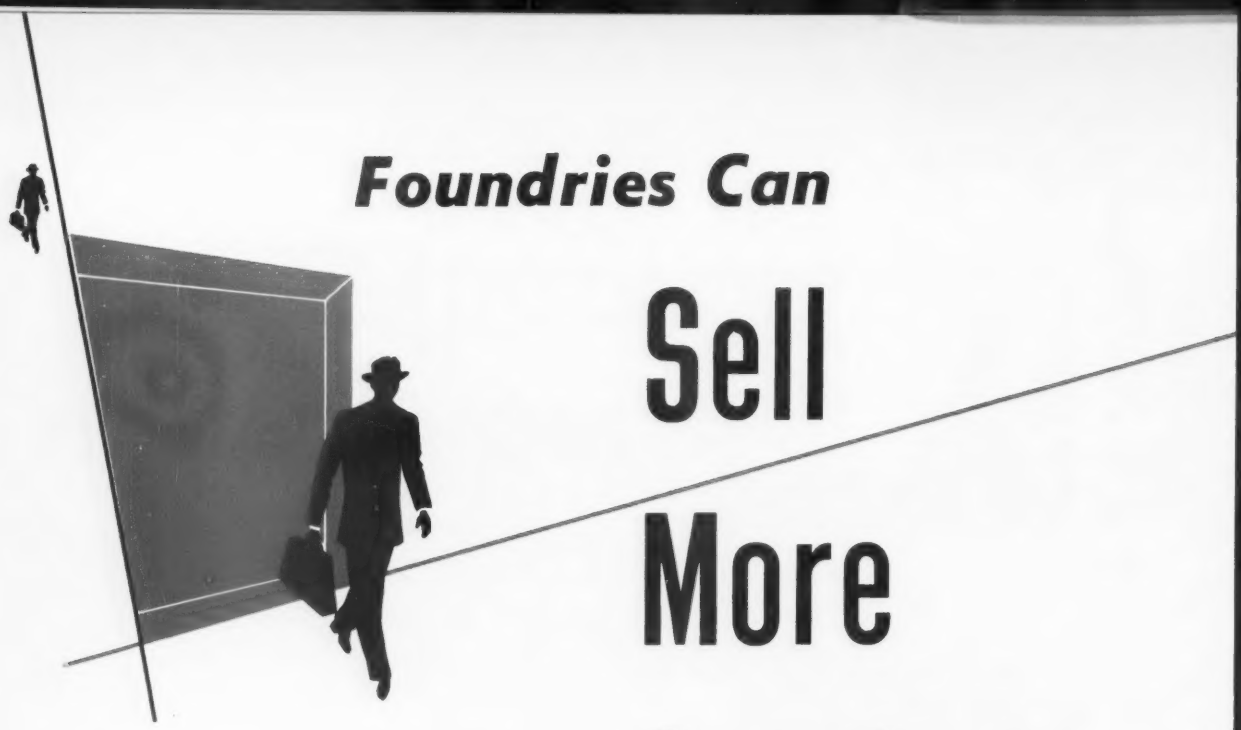
This change in pace probably was sparked by the example of a few forward-looking foundry executives who were able to find ways to expand their markets by selling castings to replace components produced by other methods of fabrication. But the real impetus to better marketing has been provided by the trade associations. Starting slowly, and at times with a regrettable lack of co-operation in some quarters, the work of market development has made much progress. Today, it is one of the major activities of most foundry trade associations. Interest in it is growing, although much remains to be done.

As might be surmised, the really aggressive organizations are using all facets of marketing. First, they are not slighting the development of better casting practices. They are providing an organization which is capable of producing excellent castings—components that serve completely the needs of customers. They are learning more about design and its ultimate effect on the production of sound castings with the desired properties built in. They are training high-type castings salesmen who are eager beavers in this field of market expansion.

To aid direct selling efforts, they are advertising in business publications and by direct mail. They are holding forums for the engineers of customer companies, and frequently have displays in industrial shows which attract buyers and engineers from a variety of fields that are users or potential users of castings. This year something new has been added. Many foundries will have displays at the 1st Engineered Castings Show, which has been designed to attract engineers and purchasing agents. The show will be held in Cincinnati, May 6-10, in conjunction with the 61st AFS Convention.

With a rapidly growing population and an expanding economy, the market for castings can grow tremendously. Then how can foundries sell more castings? The answer in part is provided in a special editorial study presented on the following 38 pages. We recommend it to you.

Frank G. Steinebach
Editor



Foundries Can Sell More Castings

By WILLIAM G. GUDE
Managing Editor

Market potentials for castings are promising — if foundries will adopt modern production methods, materials and sales techniques. This 38-page report discusses the tools and procedures available

FOUNDRIES have only limited control over the volume of business they do. Because most of their output consists of components rather than a complete article, their sales are regulated largely by the demand for the products of their customers. In brief, it's pretty hard to sell the cast base for a machine tool unless there's a buyer for the tool itself.

This general statement requires some qualification. Actually, the foundryman can, through his own efforts, influence the extent to which castings make up the components of a finished product. By improvements in foundry practices and quality of his castings, he can tap new markets, as discussed in detail starting on Page 134. By the same token, he can lose his established markets if he fails price-wise or quality-wise to meet the competition of other engineering materials.

Styles Change—The foundryman also is at the mercy of changing times—the disappearance of certain outlets for castings and the creation of new ones. These changes have been going on since the days when harness and carriage hardware and cast iron stoves were established markets for castings.

More recent trends have been the eclipse of the steam locomotive and street car and the growing application of jet power for aircraft. The gas turbine already has started to supplant the internal-combustion engine in certain forms of transportation, and is hailed by some as the automotive power plant of the future. Developments of this sort undoubtedly will continue, and they can have broad implications for the foundryman.

It is impossible to predict when and to what extent these changes will affect the market for castings. Any appraisal of the future sales potential of castings therefore must be based largely on these assumptions:

1. That castings will continue to be the shortest distance between raw material and finished product and, consequently, will figure prominently in the manufacture of most types of goods.

2. That, because of their widespread use, castings will enjoy a market regulated primarily by growth of the economy of the country as a whole.

3. That foundries will be able to provide sufficient quality in their products to withstand the competition of other materials and fabricating methods.

More People, More Business—Rapid growth in population since World War II helped considerably to promote industrial expansion during that period. Expectations of a further steady increase in number of people—and particularly in number of families—are cited as a good reason why business also should continue to grow.

This assumption is not necessarily valid. The United States population has shown an increase during each 10-year census period, but in some of those decades business was moving in the opposite direction.

Nevertheless, even if growing population is no guarantee of rising business activity, it can be a powerful force in bolstering production of the hundreds of necessities and luxuries consumed by the average family and individual during periods of relatively full employment.

Trends Are Comparable—Shipments of castings since 1946 have shown a close relationship to the upward trend in population during those years (Fig. 1). In the count of noses there has been a steady increase from about 141 million people in 1946 to approximately 170 million today. Casting shipments have had their ups and downs since the war, but the trend has been upward at about the same rate as that of population. For instance, in the 5 years 1946 through 1950, casting shipments averaged 211 pounds per capita annually; during the next 5 years they averaged 217 pounds. In 1956 the average was 213 pounds, and for all of the postwar years it was 214 pounds.

The Bureau of the Census estimates that we will have nearly 180 million people by 1960 and 221 million by 1975. Disregarding other factors, simple multiplication indicates that casting shipments in 1975 will be 23½ million tons—assuming there is no increase in per-capita consumption. But if we are to accept predictions of a constantly improving standard of living (which would mean rising per-capita consumption) it is easy to arrive—on paper—at an estimated annual total of casting shipments in excess of 26 million tons 18 years hence.

Business by Default—From the standpoint of tonnage booked, it makes no difference whether a foundry's orders increase because its customers

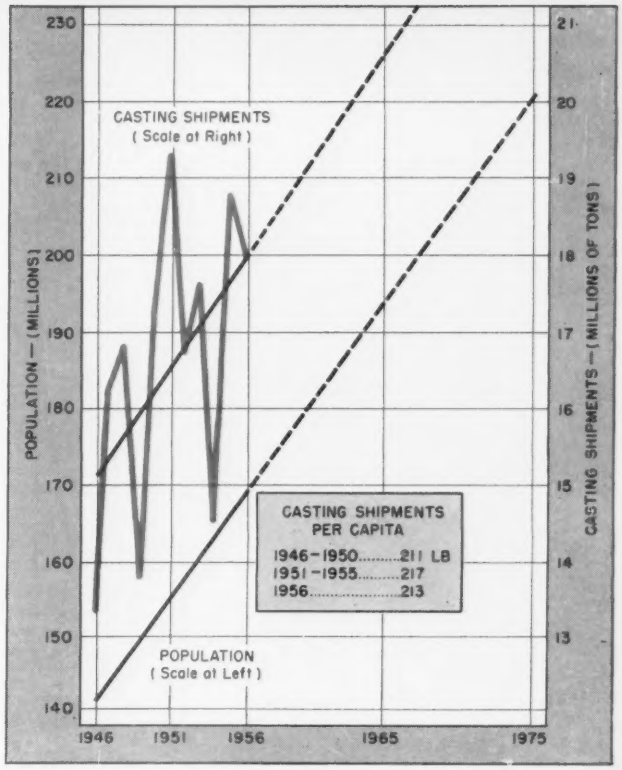


Fig. 1—Trends of casting shipments and population, with projections for years beyond 1956

are consuming more castings or because a competing foundry has gone out of business. The fact remains that for ferrous castings, shipments per foundry have increased more rapidly than have total deliveries during the last 10 years.

As indicated in Table I, shipments of gray iron castings per foundry last year were 47 per cent higher than in 1947, although the industry's total deliveries were up only 8 per cent. Steel foundries had a per-foundry increase of 35 per cent, against a 17 per cent industry gain. Malleable foundries' individual upturn of 28 per cent compares with 6 per cent for the industry total.

This situation arises from the fact that, with only one interruption, the total number of foundries in the United States has been declining since 1947 (Fig. 2). The drop has been particularly noticeable in ferrous foundries. For instance, 45 years ago there were about 4600 gray iron foundries; today there are fewer than 2300, although their average capacity, of course, is far in excess of what it was back in 1912.

This trend points to the double advantage gained by the progressive and sales-aggressive foundryman: He benefits not only from the new markets he develops through his own efforts but also from the demise of competitors who are unable to stay in business because of failure to follow his example.

In contrast to the shrinkage in number of fer-

TABLE I—Shipments of Castings Per Foundry

(1947 = 100)

	Gray Iron	Malleable	Steel	Brass, Bronze	Aluminum	Magnesium
1947	100	100	100	100	100	100
1949	91	72	80	69	65	125
1951	136	113	136	120	121	323
1953	127	118	119	101	150	331
1955	148	142	105	101	164	198
1956	147	128	135	100	162	246

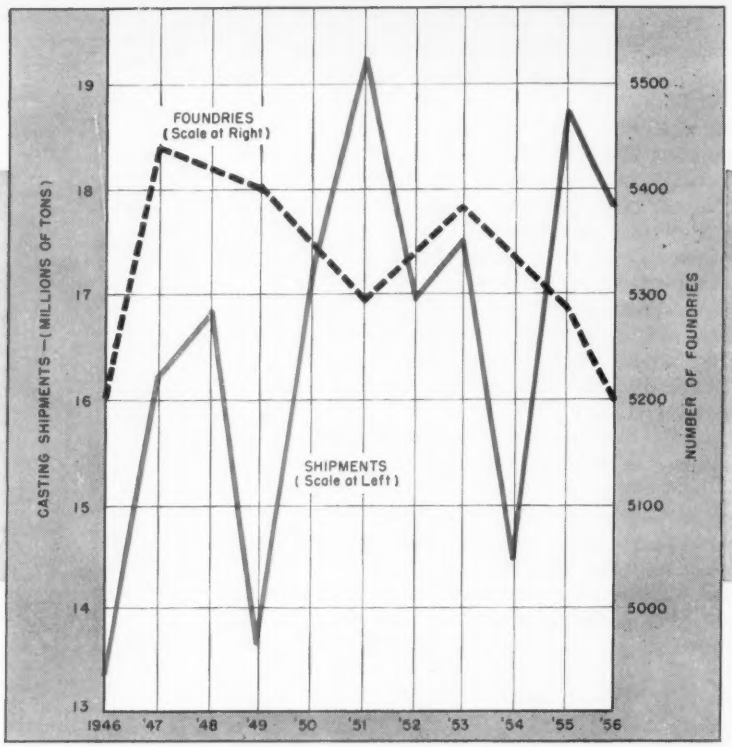


Fig. 2 — Fewer foundries are producing more castings, as these trends of the last ten years show

rous foundries, producers of light metal castings steadily have become more numerous. Today, aluminum foundries outnumber gray iron producers, although the increase since 1947 has been outdistanced by the expansion in total shipments of aluminum castings. As a consequence, shipments per foundry last year showed a larger increase compared with 1947 than was true of the ferrous foundries. An even greater gain was shown by magnesium foundries.

Brass and bronze foundries have experienced a situation different from that of either the ferrous or light metal shops. Number of brass foundries has declined but little the last 10 years, while output has barely held its own. Total shipments last year were smaller than in any of the three immediate postwar years and deliveries per foundry were about the same as during the earlier period.

Trend To Continue—It seems likely that the trend toward concentration of larger capacity in fewer gray iron foundries will continue. Mechanization has been an important factor in furthering this trend in recent years as those foundries unable or unwilling to modernize sufficiently to meet the competition of the more progressive producers were forced to close up shop.

The various large captive foundries built since the war have tended to reduce the percentage of gray iron capacity represented by the jobbing producers. The extent of this trend, however, has not been as great as is commonly supposed, partly because there has been an offsetting influence—some manufacturers have found it uneconomical to operate small captive foundry departments and have closed them in favor of buying their castings.

Government figures for 1956 show that jobbing foundries supplied 44.5 per cent of all of the more than 8 million tons of miscellaneous gray iron castings shipped. This classification of castings excludes ingot molds, cast pipe and railroad car wheels. The 1956 percentage was the highest in 4 years; in fact, in only three years since 1947 did job shops enjoy a larger share—slightly under 47 per cent in 1948, 1951 and 1952. Last year's bulge, of course, reflected the dip in automotive operations. In contrast to gray iron, following are percentages of 1956 total shipments supplied by job shops in other branches of the industry: Malleable 58.5; steel 78.5; aluminum 74, and brass and bronze 50.

Modernize or Else—The necessity for foundries to make their operations more efficient is demonstrated by figures compiled by the Bureau of the Census in the Census of Manufactures for 1954 and 1947. These data show that between those two years the man-hours required on the average to produce a ton of gray iron castings declined 22 per cent. But in view of the fact that wage rates rose faster (up 36 per cent) than productivity, the labor cost per ton increased 15 per cent. On top of this was a 45 per cent increase in the cost of materials per ton. And yet the average value (selling price) of the castings was up only 36 per cent. Obviously, the foundry unable to improve its productivity found itself squeezed between costs and selling prices.

Sources of Business—What are the sources of business needed to provide the growing economy predicted for the future? Much of this business, of course, will come from established markets

which will be expanded to meet the needs of a growing country. No small part of it will be represented by products which either did not exist in commercial form a short time ago or else meant little in the way of business volume. And heavy expenditures for research and development by many branches of industry promise to keep adding to this list of new products. Federal and industrial spending on nuclear research and development alone is expected to reach $5 billion annually by the early 1960s.

Growth in certain industries, such as food and chemicals, will have no influence on direct consumption of castings, but the indirect benefits—the use of castings as components of the equipment required by those industries—are obvious. It is estimated that about 30 per cent of the money involved in recent and planned capital expenditures by major industries is for new construction, 70 per cent for new equipment. Plant construction itself, of course, is the source of a considerable volume of castings business.

Despite the huge volume of capital expenditures by industry in general the last few years, plans for additional expansion in plant capacity are substantial. These plans embrace not only various types of manufacturing, but also ultilities, transportation and the petroleum industry.

An added stimulus to the economy will be provided by the mammoth public highway program now getting under way. This $50-billion project, termed the greatest public works undertaking in the world's history, will be spread over about 13 years. Its impact on demand for materials and equipment will begin to be felt within the next year. By 1960 it will engage 450,000 workers, plus an equal number supplying the necessary materials. Material needs—such as 49 million tons of steel, to cite only one item—will be huge, and a large amount of heavy equipment will be required.

One of the most optimistic forecasts concerning future castings consumption comes from General Electric Co. Long-range plans of this company—a large consumer of castings and a large producer for both its own and jobbing purposes—indicate that its castings capacity will double within the next 10 years. "This expectation is based on the marketing studies of the company's departments which use our castings," says E. R. Oeschger, general manager of GE's Foundry Department.

According to Mr. Oeschger, foundries can expect an increasing demand for items previously produced by other methods. He attributes this likelihood to the ever-increasing background of knowledge of casting technology, which is enabling the foundry industry to improve the quality and applications of castings.

Obviously, all foundries will not share equally in the expanded market which appears to lie ahead. Those producers able to keep abreast of progress in technology and marketing will profit the most.

The castings industry has products which can be sold. Succeeding articles in this issue suggest some of the important ways to do it.

TABLE II—Where Castings Are Consumed

(Geographical breakdown, in per cent, of consumption by manufacturing industries)

	IRON*	STEEL	COPPER BASE	ALUMINUM
NEW ENGLAND Maine, N.H., Vt., Mass., R.I., Conn.	5	3	8	5
MIDDLE ATLANTIC N.Y., N.J., Pa.	18	27	27	15
EAST NORTH CENTRAL Ohio, Ind., Ill., Mich., Wis.	61	53	47	53
WEST NORTH CENTRAL Minn., Iowa, Mo., N.D., S.D., Nebr. Kans.	6	5	3	12
SOUTH ATLANTIC Del., Md., D.C., Va., W.Va., N.C., S.C., Ga., Fla.	2	2	3	5
EAST SOUTH CENTRAL Ky., Tenn., Ala., Miss.	4	3	6	
WEST SOUTH CENTRAL Ark., La., Okla., Tex.	1	2	1	1
MOUNTAIN Mont., Idaho, Wyo., Colo., N.Mex., Ariz., Utah, Nev.	1	1	...	
PACIFIC Wash., Oreg., Calif.	2	4	5	9
	100	100	100	100

*Includes gray and malleable iron. Figures based on Bureau of the Census data.

TABLE III—These Industries Buy Castings

(How principal types of metal fabricators rank in purchases of castings. Excludes castings produced and consumed in same plant)

INDUSTRY	Approximate Per Cent of Total
MOTOR VEHICLES AND PARTS	32
METALWORKING MACHINERY Machine tools, jigs, tools, fixtures	9
TRACTORS AND FARM MACHINERY	8
GENERAL INDUSTRIAL MACHINERY	8
Pumps, compressors, blowers, industrial trucks, power-transmission machinery, etc.	8
SPECIAL INDUSTRIAL MACHINERY Textile, papermaking, printing, food-products, woodworking, etc.	7
RAILROAD EQUIPMENT Cars, locomotives	6
ELECTRICAL MACHINERY Motors, generators, appliances, transformers, controls, etc.	6
FABRICATED METAL PRODUCTS Tools, hardware, plumbing fixtures, boiler shop products, heating and cooking apparatus, etc.	6
CONSTRUCTION AND MINING MACHINERY	5
ENGINES AND TURBINES	5
SERVICE AND HOUSEHOLD MACHINES Laundry, dry cleaning, sewing, refrigeration machinery, etc.	4
VALVES AND FITTINGS	4

Based on Bureau of the Census data.

Modern Methods and Materials

Can Boost Sales

Improvements and additions to foundry methods, equipment and materials in recent years offer foundrymen top-notch tools for high-production rates of controlled quality castings to meet the competition of today's markets

By ROBERT H. HERRMANN
Associate Editor

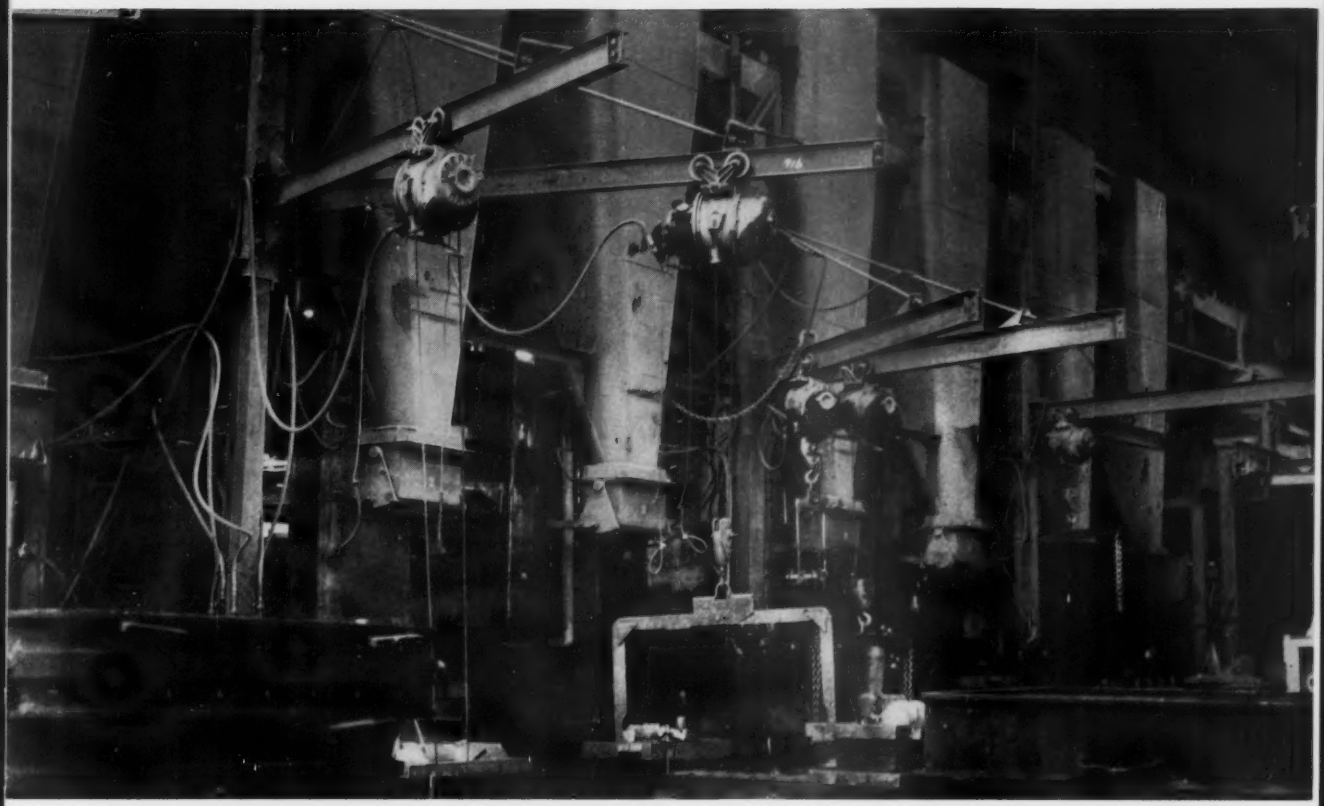
MORE methods are available today than ever before for producing castings to meet exacting customer requirements. Effective use of these methods means the difference between success or failure for foundries.

Which methods to use and when and where to use them are important management decisions. The choice must be based on thorough knowledge and understanding of the advantages and disadvantages of each. An important point to keep in mind is that every foundry method existing today has qualities which best suit it for certain applications. No one method is displaced completely by another. There are no pills, no pat answers, no gimmicks that will meet all needs or solve all problems—there never has been and never will be.

First step in lining up tools for more marketable castings is to examine your existing facilities and abilities. Does your personnel possess skills which can be exploited more fully? Is your foundry best suited to produce certain types of castings or castings of a given size range? Does the area you serve offer a stronger market for a few or several types of castings? Can your production methods produce castings to meet those needs? If not, what methods do?

Next step is to determine the merits of available foundry processes, materials and machines. Study the literature. Listen to the experiences of others at association meetings, conferences, conventions and bull sessions. Visit foundries using the various processes. Do a little experimenting in your own foundry on processes you think might fit into your operation. If, after exhaustive study, a process doesn't work out, be brave—forget it. Equivalent money and effort that would be put into a new process may reap more benefits if put into improving equipment and techniques of a time-tried process. It is better to be on the black side of the ledger than on the bandwagon.

Work with Customer on Design—With the knowledge gained from analytical study of foundry methods you are well qualified to make recommendations that will give your customer or prospective customer the best part for his needs at the lowest cost. You will be able to discuss intended use for the part he wants. You will be able to give factual advice for designing a part that will



Many factors enter into the selection of the best molding method to use after the proper design of a casting has been established

give the best service in use. Tests with brittle lacquers, strain gage analysis, radiography and magnetic particle observation methods can be used in developing the design. Even if they do not always admit it, customers appreciate that sort of service. They get it from other fabricators. It convinces them that you know what you are doing and why. They begin to have confidence in castings. Is there a more potent selling tool than confidence?

When the design has been set, molding methods can be considered. Many factors enter the picture. How many castings are needed? How close must tolerances be? How much machining can be eliminated? How much machining must be done in any event? How good a surface finish is needed rather than merely desired?

Some of these questions pose a real opportunity for the well-informed foundryman to explain the facts regarding the much-publicized features of new methods. Claimed accuracies and finishes are not always needed nor do they come cheaply. Nor are they always practically obtainable to the degree envisioned by customers.

In one instance a customer paid for and received parts cast to a tolerance of a few thousandths of an inch. Then he made a rough machine cut which cleared away the tolerance and made the part undersized. So he complained to the foundrymen that the parts were cast undersized and cost too much, whereupon he took his business elsewhere. What practical difference does it make if a part which must be machined is cast to 0.005 or 1/32-in.? What's the use of making sashweights with a finish measured in microinches? Since extreme accuracy adds to tooling and production costs, good engineering practice dictates limiting close tolerance to necessary dimensions.

Avoid letting a customer buy something he cannot use. Also do not sell him something he cannot use. On the other hand, offer him every facility in your shop that will give him a casting to meet the requirement for which it is intended.

Green sand molding still offers the best bargain for all sizes of castings in quantities of one to thousands, where tolerances need not be in thousandths or finishes in the microinch range. New developments in green sand molding equipment and in sand additives, however, make possible improved molds which produce castings to closer tolerance and with finer finish. Green sand practice offers one more thing. With generations of experience behind it, there is strong potential for improvement through use of high quality, well maintained pattern, flask and molding equipment, plus the application of good, careful practice.

Shell molding will give tolerances as close as 0.005 in./in., but be careful across the parting line. Tolerances may not be as good there. Finishes in

microinches for ferrous alloys are 150-250; for nonferrous alloys, 125-200 and for nodular iron, 100-150. Castings weighing from ounces to a little more than 400 lb and up to between 30 and 36 in. in largest dimension have been poured. Although many generally used metals may be poured in shell molds, the irons and high-alloy steels predominate. Minimum section thickness for gray and nodular iron generally is ⅛-in.; for high-alloy steel, aluminum and magnesium 3/16-in.

The process is well adapted to high-volume runs in a mechanized setup. Tooling up for most short-run jobbing work is costly.

CO_2 process molding has found application for large work where drop-outs can be avoided during mold handling or where baking can be eliminated. The time for large mold making can be reduced considerably.

Investment casting offers a casting finish of 50 to 100 microinches and tolerances of ± 0.002 to 0.005 in./in. Developments within the investment casting industry have led to creation of several techniques using one-piece poured molds, spray or dip-coated shell molds and multipiece molds. Those techniques include the Ellis, Glascast, Investment X and Shaw processes. Certain advantages are claimed for each and some produce larger parts than others.

The investment process is adapted to making intricate parts which cannot be cast by any other method. Because of the accuracy with which certain parts can be cast, investment molding often is used for casting metals which are difficult to machine.

Diecasting offers low unit cost, but high tooling cost. Thus it is adaptable to large production runs. It produces castings with accuracy and surface finish comparable to that achieved by investment casting. One of the fastest casting methods, it is used to produce zinc and aluminum castings primarily, although parts also are cast in other metals.

Cored holes 1/10-in. in diam can be cast to a depth of ⅜-in.; 1-in. diam holes 8 in. deep can be cast. In small castings, sections as thin as 0.015 in. have been cast.

Permanent mold casting is used to produce parts of aluminum, iron, lead, magnesium, zinc and copper-base alloys. Tolerances are in the range of ± 0.010 to 0.050 in. on a dimension for many castings. Surface finish falls between that obtained by shell molding and diecasting. Minimum section size for most iron castings is 3/16-in.; for aluminum castings it is ⅛-in. The method is adapted to long-run jobs where total cost of finished castings will be lower than that provided by green sand molding due to reduced machining cost, more accurately dimensioned and located cored holes and closer tolerances. In recent years, however, shell molding with automatic equipment has become quite competitive.

Centrifugal casting is a general term usually covering true centrifugal, semicentrifugal casting and centrifuging. It describes forces used to distribute metal in a mold rather than a specific

Foundrymen have choice of methods for making cores used in green, dry sand and shell molds

molding process. Molds can be made of steel, gray iron, green or dry sand, plaster or graphite, and they must be designed for the centrifugal process. It produces castings of uniform structure, permitting the use of rather high design stresses. Minimum tolerance on parts up to 2 in. is ± 0.005 in. On parts over 2 in. it is ± 0.010 in. and not over ± 0.030 in. Centrifuging is adapted to making small castings and intricate parts that would require much metal in the gating system if cast statically. However, pressure processes such as diecasting and investment casting when vacuum is applied to the bottom of the invested flask during pouring also offer high yield ratios.

Moldmaking equipment manufacturers have been turning somersaults to keep up with progress in molding processes. The result is that today's foundrymen have a wide choice of equipment to produce high-quality molds. Trends are toward mechanized equipment of both versatile and specialized units. Mechanizing in itself is a strong factor in improving casting quality by reducing the chance of human error. By eliminating much of the hard work in moldmaking, these machines improve employee morale—another factor in bettering product quality.

Makers of permanent mold and diecasting machines also are keeping pace with industry needs. Newer equipment is offering faster cycles, higher injection pressures in the case of die casting machines and greater capacity. Size of castings which can be produced has grown rapidly in recent years.

Patterns, Coreboxes and Dies—Because casting shapes are created by this equipment, every effort should be made to incorporate the most modern principles of design to achieve high casting quality, good appearance and, thus, a readily marketable product. Principles of optimum gating developed over recent years should be used. Proper blending and streamlining of casting sections to distribute stress throughout the casting is desirable. Such a part is easier to cast, too. These

new, proved principles of design often differ with some of the design hand-me-downs from grandfather to father to present generation. But progress is like that. You must go ahead or go back; there's no standing still.

As for pattern and corebox equipment for green and dry sand work, wood and metal still predominate. Recent developments in epoxy resin equipment, however, indicate the possibility of advantages with this new material. Claimed characteristics are light weight; good dimensional stability; high compressive, flexural and impact strength; good resistance to chemicals and abrasion and easy release from sand.

For shell molding, most patterns are of iron or aluminum; some are combinations of aluminum and a copper-base alloy. Wearability is a desirable factor, but another is uniform heat distribution over all surfaces. External heat sources are used for patterns with contoured backs, or rods of high heat conductivity materials are inserted to get heat to high spots on patterns. Built-in electrical resistance rod heaters following pattern contours also are used.

Wax, plastic and mercury are the pattern materials for investment molding. Certain production advantages make plastic advantageous in many instances for large runs. Wax offers advantages in producing very intricate castings, which comprise a large part of investment casting business. Mercury permits making larger castings of considerable detail. A new method of wax pattern removal has been brought to the industry by the Investment "X" process of investment molding. It involves dissolvement of the wax by trichlorethylene vapor, thus avoiding mold stresses and possible cracking which may occur due to uneven expansion of wax and mold material when assemblies are heated to remove the pattern.

Cores—Several new developments offer foundrymen a choice of methods for making cores used in green sand, dry sand and shell molds. Major advantages offered by these new methods are reduction of coremaking and baking time, handling and core storage. Money savings so achieved may offset increased costs of the new binders. However, no one method is adaptable to making all types and sizes of cores to the exclusion of another method.

Many developments in coremaking equipment of all types offer foundrymen a choice of tools to take full advantage of coremaking processes best adapted to individual needs. The basis for selecting equipment, like that for selecting a process, rests on an analysis of what fulfills the need and the ultimate goal of producing more marketable castings at a lower cost.

Mechanization also has been a major development in equipment for preparing molding and core sand mixes. Consistent formulations thus achieved increase the effectiveness of control procedures with beneficial results on casting quality. Automatic equipment for measuring temperature and moisture content of sand and governing water additions accordingly is part of the mechanization picture. Wider use of testing equipment as a control over sand mix formulation also is a factor in improved quality for better marketability of castings.

Conventional sand preparation equipment generally is used to prepare the mixes required by some of the newer processes. In some cases certain additions or alterations are made to adapt the equipment to a given processing requirement.

Melting—Much interest has developed about basic-lined cupolas because of the low-sulphur irons they produce. Such irons are desirable for making nodular iron—another tool which can be used to supply customers with castings having strength characteristics desirable for certain applications.

Improved metallurgical properties also are claimed for iron melted in cupolas equipped with dehumidification equipment for the blast air. Use of dehumidified blast air is said to be particularly advantageous in producing base iron for making malleable iron.

Hot blast also offers use of higher iron to coke ratios plus faster melting rates. Equipment for injecting loose borings into cupolas is being used in a few foundries. In effect, this operation adds another raw material which previously was discarded or sold at a low scrap value except where use of briquetting equipment was feasible.

A new method for desulphurizing iron, in addition to soda ash and other fluxes commonly used, has been employed in a few foundries. It involves injection of calcium carbide into molten iron. Also when nodulizing agents are injected with calcium carbide, properties of an iron produced from an all-steel charge are said to be upgraded. Furthermore it is claimed that a mixture of graphite and calcium carbide introduced to an iron produced entirely from scrap raises carbon content, reduces sulphur and lessens the amount of silicon required.

In the light metals field, development of an automatic, continuous aluminum melting furnace is said to offer clean, sound metal, permit melting

Quality of metal poured in molds reflects improvements in melting equipment and practice

different alloys in quick succession and to be practical for melting comparatively small amounts of metal for short-run casting jobs.

The combination dry hearth and holding furnace is another recent development for aluminum melting. It is a single, divided unit in which metal melted in one side flows to the other side into a holding compartment.

Improvements have been made in other direct flame furnaces such as reverberatory and barrel types and in indirect flame crucible and pot-type furnaces. Most manufacturers offer a choice of gas or oil firing. Electric furnaces used in nonferrous foundries mainly are of two types. One is the indirect arc, rocking furnace and the other is the induction furnace which may be of either the high or low-frequency type.

Open hearth and electric-arc furnaces, either acid or basic-lined, still are the predominant melting units in steel foundries. Induction furnaces are well suited to produce high-alloy and special steels in small heats. The converter fulfills well the requirement of almost continuous pouring and in addition occupies comparatively small space. Converters are charged with molten metal, usually supplied by a cupola.

Vacuum melting as yet is impractical for production application. Although alloys produced in vacuum are said to be superior metallurgically and to have better properties than alloys melted in air, preservation of those qualities for castings is assured only if molds are poured in a vacuum or inert atmosphere. Equipment is available for producing a few castings to meet highly specialized requirements, but so far have not been applied to production of run-of-the-foundry castings such as made in jobbing shops.

Consideration of all these melting tools as aids to improved marketability of castings must take into account the elements of equipment cost compared with possible metallurgical improvement, reduction in production cost and greater production rates. General adaptability of the equipment to the foundry's general line of work also is an important consideration.

Heat Treating—Improvement of tensile strength, ductility, wear resistance, machinability and other properties to meet desired requirements can be achieved in many instances by heat treatment. The technique of heat treatment applies to practically all foundry metals. In the brass and bronze field, however, treatment is confined mainly to the aluminum bronzes and the precipitation-type alloys. Investigation of heat treatment possibilities to meet customer requirements will offer further opportunities to improve marketability of castings.

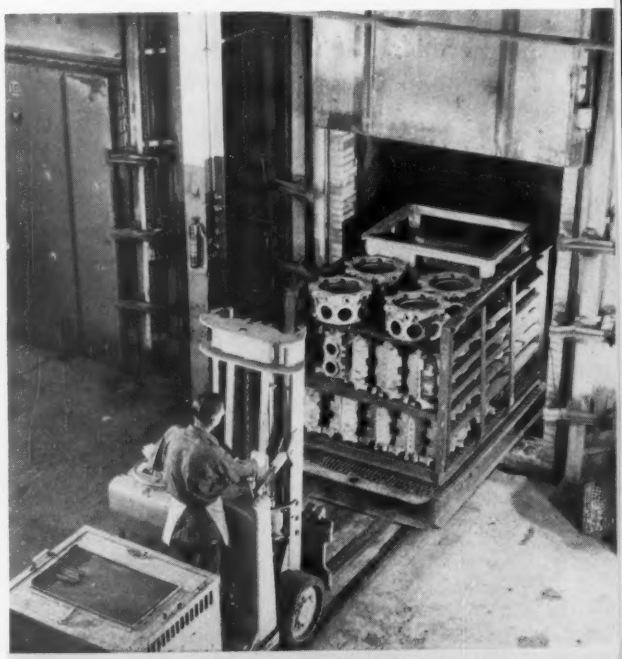
Casting Cleaning—With customer demand for castings with closer tolerances and finer finishes, cleaning room practices assume greater importance. There is little point in producing a good casting finish that may be ruined in the cleaning room. On the other hand, poorer finishes might be improved by proper cleaning methods. Careful selection of proper equipment to do the job, coupled with the intelligent use of equipment for various types of castings, offers possibilities for the cleaning operation to be another tool in quality production. Potentials of mechanical, air, water and chemical systems of cleaning should be considered to fulfill requirements of the casting cleaning job.

Inspection methods and equipment, besides being used to weed out defective castings, increasingly are serving a constructive purpose as a control tool. Proper study of poor castings revealed by inspection and immediate use of the knowledge gained to remedy the causes are great factors in improving operation efficiency and casting quality. Here, again, a wide selection of equipment is available to foundrymen.

Material Handling—This field of activity continues to be one of the industry's most potent areas for improved efficiency. The proper handling of materials in process can eliminate bottlenecks, help maintain a safe and orderly plant, conserve time of skilled workers, increase morale, keep productive equipment busy and reduce labor cost. It is the substance of automation.

Much planning, however, must go into deciding how much mechanization a foundry should have and what type of equipment should be used. With advancements made in the wide variety of equipment available to handle material, small and large foundries, job shops and specialized production facilities can find what they need.

Agreement is universal on one major point—any addition of material handling or mechanization equipment should be based on a master



Heat treating offers opportunity to improve physical properties of many types of castings

plan which envisions the completed system. In other words, equipment should not be installed haphazardly on the basis of expediency; it should fit in with existing equipment and with that which is planned for future installation.

The handling of material through a foundry might be looked upon as the sinew that binds together a series of processes into one co-ordinated tool for producing better castings at lower cost to meet the stricter demands of a competitive market.

Engineering and Processing Advice—Several engineering firms as well as many equipment and supply companies offer help to foundrymen in solving problems involving equipment installations or processing methods. Such service can be of great aid in smoothing the way to producing a better product for your customer.

CONTROLS . . . *can help to develop a more saleable product*

By KENNETH L. MOUNTAIN
Associate Editor

THE challenge to sell more castings is ever-present. For the foundryman with initiative, vision and perseverance there is no limit to the lost business that can be regained and the new business that can be generated. What must be done first is to find techniques that will assure the economical production of castings on a quality level satisfactory to customers. A sure way to accomplish this objective—and one which too many foundrymen overlook—is to establish controls that will refine and improve present production methods.

Information in the preceding articles has pointed out future market potentials and appraised equipment and process capabilities as we understand them today. There seems to be no question that the equipment, raw materials, supplies and technical know-how available to the foundry industry today are at their highest level.

Properly kept records, like these charts on sand characteristics, are essential to quality control

Nevertheless, if the foundry industry is to progress, keep pace with the expanding economy and maintain its rightful place in the industrial production picture, wasteful practices and inefficient methods must be eliminated. In addition, the foundryman must learn to combine harmoniously his artistry and craftsmanship, raw materials and equipment with a program of rigid controls that will enable him to produce castings that consistently meet high quality standards and customer needs.

Quality Plus Quantity—Emphasis on quantity these days has created a tendency to neglect the quality level of production, yet quality and quantity should go hand in hand; one without the other is meaningless. Quality is the result of organized, preplanned, determined effort to aid in reducing to a minimum the unforeseen variations that occur during production procedures and to assure shipment of satisfactory castings to the customer.

To improve the quantity production of quality castings, an increasing number of progressive foundries are turning to properly instituted controls as a means of tightening up casting processes, reducing scrap losses, boosting sales and increasing profits through a newly found ability to produce castings that maintain consistent quality.

There is nothing revolutionary in the philosophy of controls. It is the application of common sense principles to the examination of plant, equipment, methods, materials, procedures and personnel to uncover facts needed to plan to prevent defects from recurring.

It must be understood that controls by themselves will not boost sales or increase profits. But there is no doubt that controls can be of material help in calling attention to production losses where they are occurring. When faulty production methods are eliminated, increased profits will result from the same expenditure of manpower and

from increased sales made possible by a quality product.

Any controls program is only a tool and requires proper use for best results. A vital element in any program—no matter how small or large—is the need for complete agreement and co-operation, from management through supervisors and production workers, as to the objectives of the program. If this agreement and co-operation are not present, difficulties will arise that will be difficult to overcome.

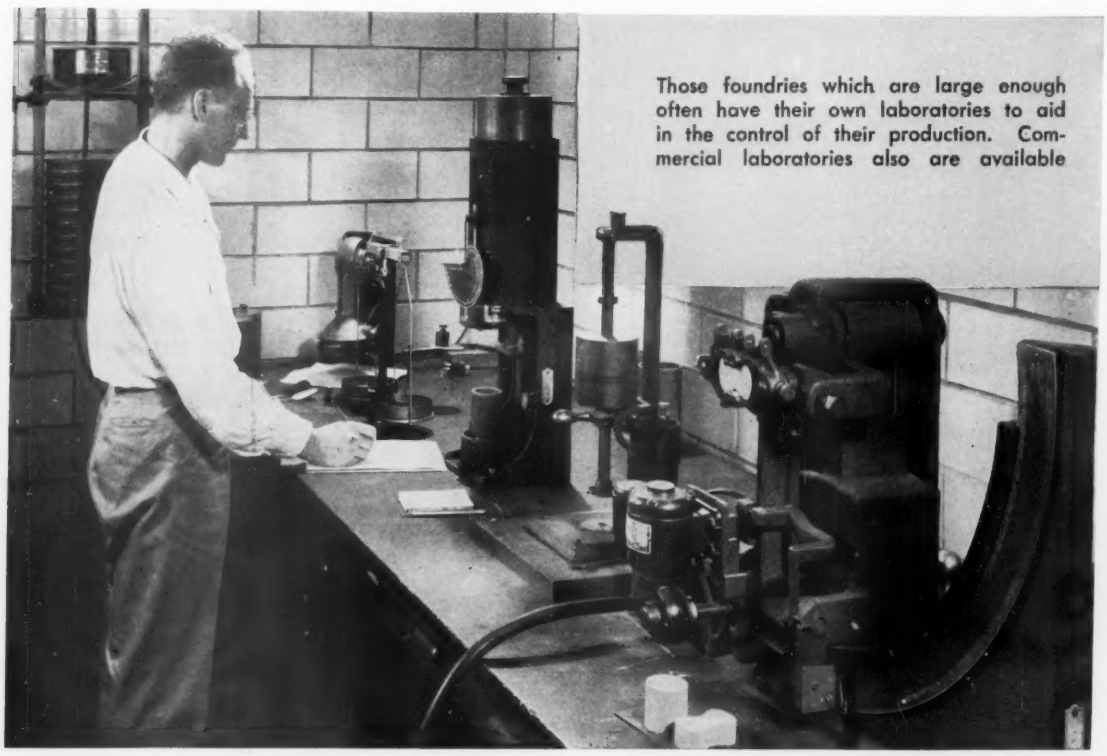
Management and supervision should attempt to create an atmosphere or an attitude toward quality that encourages every employee to contribute his best efforts to the production of the best casting possible. Pride of workmanship and a sense of belonging to a skilled team will go far in realizing the goal of any controls program—prevention of defects.

How Much Control?—As sizes and types of foundries vary, so will the extent of the controls program. In all cases, however, three basic elements must be present: 1. An objective (reduce scrap losses and improve production efficiency per man-hour expenditure). 2. Course of action (what shape the program will take, who will be responsible for carrying it through and who will determine what constitutes an acceptable performance). 3. The follow-through (how well the program has succeeded).

Perfect castings and perfect production processes are nonexistent, but an area—wider in some foundries than in others—exists where continued effort applied toward reaching near perfection will provide handsome benefits. An ideal spot in any foundry to begin such an effort (in effect, a controls program) is with raw materials and their properties as specified before purchase. An industry trend is developing toward buying materials and supplies by specification, and the foundry should be duty-bound to inspect and analyze all incoming shipments to make sure the specifications are met.

Foundries that have instituted successful control programs have found that all of the following areas are especially rich sources for self-improvement and provide a challenge when analyzed: Condition of equipment; melting practice, including charging procedures; metal analysis and specifications; pouring temperature control; properties of sand, as received raw and while being blended or otherwise introduced into production; coremaking and molding practices; inspection of cores and molds; baking temperatures and time cycles for ovens; core setting, mold closing and pouring practices; shakeout and cleaning; gating and risering; casting and pattern design; and analysis of defects.

Inspection and sampling are important elements in the controls program and should be the fact-finding, fact-giving activities designed to provide information to plan and to initiate corrective action when deviations from expected quality occur. Honest appraisal and analysis of these deviations naturally will direct attention to metallurgy, materials, patterns, coreboxes, flasks, equipment, procedures or other aspects of the production picture.



Those foundries which are large enough often have their own laboratories to aid in the control of their production. Commercial laboratories also are available

Where You Stand—If it accomplishes nothing else, this self-examination will indicate what your performance level is and provide the information needed to assist in developing and improving the know-how already existing among production and supervisory personnel.

Such a searching self-analysis should point out the need for concentration on the few problems that are causing the most trouble, with an objective of improving the procedure until further improvement is uneconomical. When that point is reached, the operation will be in control.

Elimination of some of the production variables (all of them can never be eliminated completely) is a proved step in the right direction to the goal of all foundries—production of a satisfactory casting for the customer. It must be remembered, however, that the customer continually is demanding an improved product. Your production efforts must be keyed to anticipate and meet these demands.

If you succeed, you will sell more castings.

MATERIALS . . . *are available to fill a wide variety of applications*

By EDWIN BREMER
Metallurgical Editor

Small amounts of alloying elements are capable of producing effective changes in properties

TO SELL more castings, a foundryman should be conversant with representative specifications relating to the various metals and alloys available for casting production. This knowledge is important because consumers of castings are becoming more and more specification-minded, and those foundries which heretofore have managed to escape commitment eventually will have to meet them to stay in business. When that state of affairs comes about, it undoubtedly will be beneficial to the whole foundry industry since all foundries will be talking the same language with respect to the metals and alloys. This development will eliminate substitution of substandard materials in quotations.

As John W. Bolton remarked many years ago, specifications are supplementary to the skill and integrity of the producer since they define only certain minimum characteristics which may or may not be related to the necessities of service. They do, however, indicate the potentialities and uniformity of the materials.

Specs Are Numerous — An indication of the growth in specifications is revealed in a cursory examination of those published by seven well known bodies, including the American Society for Testing Materials, Society of Automotive Engineers, the federal government, and the military forces. This check shows over 280 specifications describing nearly 500 classes or types of metals and alloys which are made into castings. In addition, numerous others are established by other groups as well as by individual firms. Fortunately, many of the specifications indicated are duplications in that under different designations, several or all of the stipulating bodies describe the same metal or alloy.

Even with the elimination of duplication, examination reveals around 230 metals and alloys available to foundries to meet a wide range of applications. Of these, the greatest number is in the nonferrous field, as is to be expected since that category covers several base-metal combinations. That field shows slightly over 120 metals and alloys, of which about 53 per cent are copper-base, 31 per cent aluminum-base, 6 per cent magnesium-base and 5 per cent each cobalt-base and nickel-base. The ferrous field offers nearly 110 different materials, with a little more than 54 per cent pertaining to steel, more than 30 per cent to gray iron, 3 per cent to malleable iron, 6 per cent to pearlitic malleable and 7 per cent to nodular iron.

Although it hardly is expected that every foundry will need to be conversant with all of the specifications, it at least should be familiar with those pertaining directly to the metals and alloys used in its castings. The well-advised, progressive foundry dislikes, however, to confine its knowledge within such narrow limitations, and it looks farther afield. It looks toward those metals and alloys which are or might be competitive and considers them from two viewpoints. In both, a good knowledge of properties and capabilities, advantageous and disadvantageous, is essential, but it is employed somewhat differently to reach opposing objectives. In one, the knowledge is used to dis-

Nonferrous casting industry relies upon ingot alloys which are made to exact specifications

courage encroachment into its field; in the other, it is utilized to provide entry into other fields.

Data Are Available—Although knowledge gained from a study of specifications throws considerable light on the properties, composition and potentialities of various metals and alloys, complete information must be obtained by study of the literature. Pertinent data are available in papers presented at meetings of various related societies and in handbooks prepared by them, in metal and alloy producers' literature and in articles published in business magazines like FOUNDRY. The time spent in studying such material is well worth while since it often brings out facts which will help to convince the customer that casting is the best means of fabricating his product.

Continuing study of the literature soon reveals that it relates not only to new materials and methods, but also to improvement and advancements of the old. That progress indicates an increasing interest in development of metals and alloys with special properties to meet the demands of rapidly advancing technology in other fields. Those requirements include high tensile strength, resistance to high and low temperatures and to corrosion, high electrical and thermal conductivity, wear resistance, etc. Desire for high tensile strength arises from two objectives: To make parts which will take higher loading or to permit reduction of weight through use of smaller cross-sectional areas.

Two Approaches—The weight-strength problem is important and is being attacked by two approaches. One is improvement in properties of both heavy and light metal-base alloys already available, and the other is development of new ones. The latter would include development of nodular graphite iron through addition of magnesium to low-sulphur gray iron and the great activity regarding titanium and its alloys. With regard to improvement in available alloys, one can point to the high-tensile cast steels with a minimum of 180,000 psi, to the nickel-bearing aluminum and manganese bronzes, the magnesium-silicide type aluminum-base alloys and the magnesium-base alloys containing rare earths, zirconium and thorium.

In many applications, castings must withstand elevated temperatures, and whether or not a particular alloy or metal may be used depends on the temperature and service conditions. In general, the brasses may be used in applications for which the temperature does not exceed 400°F; the bronzes up to 500°; and aluminum alloys up to 600°F. The usual magnesium alloys are used up to 300°, but with thorium and zirconium types the range is extended to 600°F. It should be pointed out that actual limitations on temperature use are obtained only by extended field tests under operating conditions since in numerous instances a given alloy has been used successfully at a temperature beyond that indicated. Use of aluminum and magnesium-base alloy pistons in automotive and diesel engines provides such an example. The temperatures reached on the crown of such castings are estimated to be around 900°F.

High-Temperature Conditions—In higher temperature applications, ferrous materials and cobalt-base and nickel-base alloys are employed. Since plain gray irons tend to grow at around 900°F and carbon steels to scale at between 900 and 1000°F, alloying with strong carbide stabilizers is employed to extend the temperature application ranges. Gray iron alloyed with about 1 per cent chromium, for example, is reported to withstand temperatures up to 1400° under certain conditions. For pressure-containing parts, gray iron is limited to 650°F. For temperature applications over 1200°F, highly alloyed materials are employed, as illustrated by an alloy containing 26 to 30 per cent Cr and 14 to 18 per cent Ni which is used for temperatures up to 2150°F.

For high electrical and thermal conductivity applications, pure copper is outstanding, and sound castings are secured by use of potent degasifying agents which do not affect the conductivity values. Where higher strength and hardness than those obtainable with pure copper are desired, additions of small amounts of chromium and silicon or beryllium to copper with suitable heat treatment will give conductivity over 85 per cent, tensile strength over 50,000 psi and brinell hardness of 100.

Alloying Additions—Mention of the use of small but significant amounts of alloying elements to copper to produce effective changes in properties brings to mind some others. Probably the most familar to foundrymen is the addition of small amounts of magnesium to low-sulphur gray iron, which results in an iron with the graphite in nodular or spherulitic form instead of in flakes. Cerium acts in a similar manner.

Earlier mention was made of the addition of thorium, zirconium and rare earths to magnesium-base alloys to provide enhanced properties at elevated temperature. Addition of rare earth metals

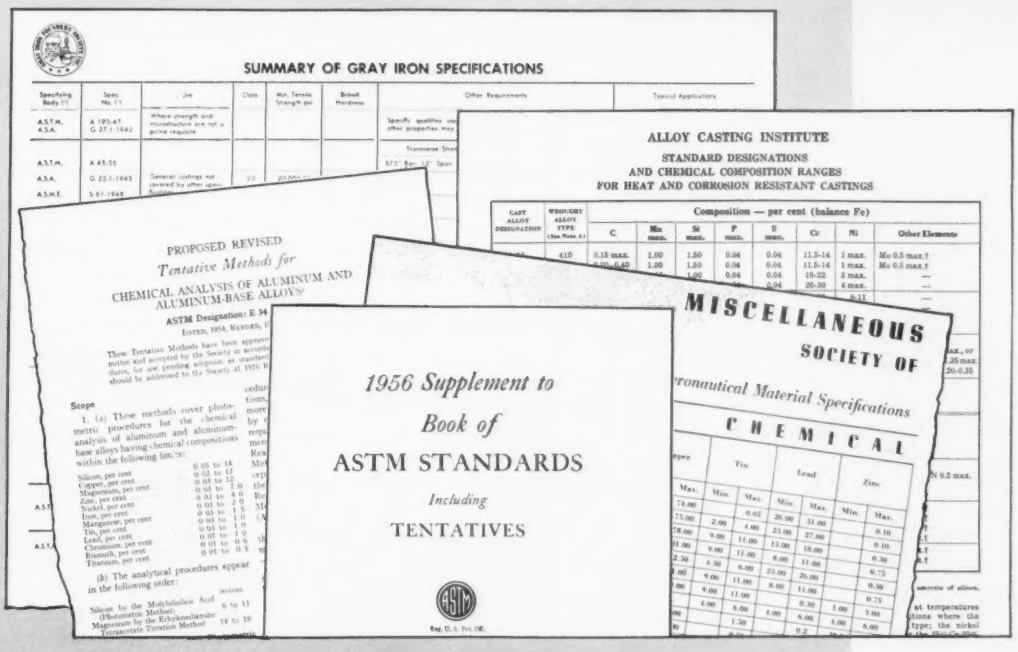
to steel also has resulted in improved properties, particularly in impact and ductility at room and low temperatures. Use of magnesium and silicon in aluminum alloys is, of course, one of the early developments in gaining improved properties. Recently claims were made of much higher strengths in certain types of the magnesium silicide alloys through addition of beryllium and sodium.

Malleable foundrymen are familiar with the application of a small percentage of boron to counteract the carbide stabilizing effect of chromium encountered in scrap additions. A more recent development is the use of bismuth in amounts from 0.005 to 0.02 per cent to prevent mottling in sections up to 3 in. thick. Another, also in the malleable iron field, is the production of pearlitic malleable by use of much higher than normal sulphur content.

Mention also should be made of the use of small amounts of columbium, tantalum and titanium to austenitic stainless steels to prevent precipitation in the grain boundaries. Selenium often is used in these steels to provide formation of favorable sulphur inclusions and better ductility. In nodular iron production, use of small amounts of cerium or mischmetal counteracts the effect of subversive elements. In gray iron, addition of a minute quantity of tellurium will produce white fracture iron.

Judicious selection from a variety of raw materials is needed in gray iron production

With elimination of duplication, specifications cover 230 foundry metals and alloys



Research and

Create New Markets

Research and product development are basic aspects of an effective sales program. Research provides the means to make better castings, and product development uses that ability to sell new markets

By JACK C. MISKE
Associate Editor

AT one time, about all a foundryman did to sell castings was to leave the door open and wait for someone to walk in and order a batch of stove plate. Some foundries still are able to operate on that basis, but not many. Most of those who stuck to the old technique long since have gone bankrupt. Both castings and the nature of their markets have changed. With the advent of this change, research and product development have taken on considerable importance.

Nevertheless, too many foundrymen have gone about marketing their products only halfheartedly. Castings are a commodity, and like any other commodity, they must be sold. Research and product development are basic aspects of any effective sales program. Let's take a little time to define them before we discuss them as sales tools.

Research — Basically, research falls into two broad classifications, pure or basic research and developmental research, and generally the first precedes and leads to the second. Basic research investigates theories, principles and properties. It ventures into hitherto unexplored areas to search out the ore from which useful products can be refined. In itself it seldom produces any results of immediate intrinsic value.

In the second, or developmental phase of research, the practical applications begin to appear. In this phase, the raw knowledge turned up by pure research is transformed into new materials, processes or methods which enable men to make new or better products for everyday use.

Product Development — Research and product development are pretty much interrelated areas, since any research findings help in the production of a better product, but in the foundry field the term "product development" has at least one meaning beyond what it might mean to most other industries—conversions to castings from other forms of fabrication.

Essentially, for a foundryman, product development applies then to three kinds of activity: 1. Development of means to produce better castings. 2. Development of new markets for castings as components of new products (air conditioning units are a recent example). 3. Conversions to castings from other forms of fabrication.

So much for definitions. Let's turn to the subject which is the real interest of this article—how we can use these tools to sell more castings.

Research Aids Casting Sales — The main point about research is that it provides the only key to long-term success. To maintain and improve its position, every company in every industry must progress — that is, it must improve its product. And research is the source of such progress. It's the factor that will make it possible for foundries to sell their castings in the future.

In recent years, progressive foundries and their suppliers have become increasingly aware of the value and need for this function of research. The result has been a spate of new developments and new data, most of which are coming into wider use each year.

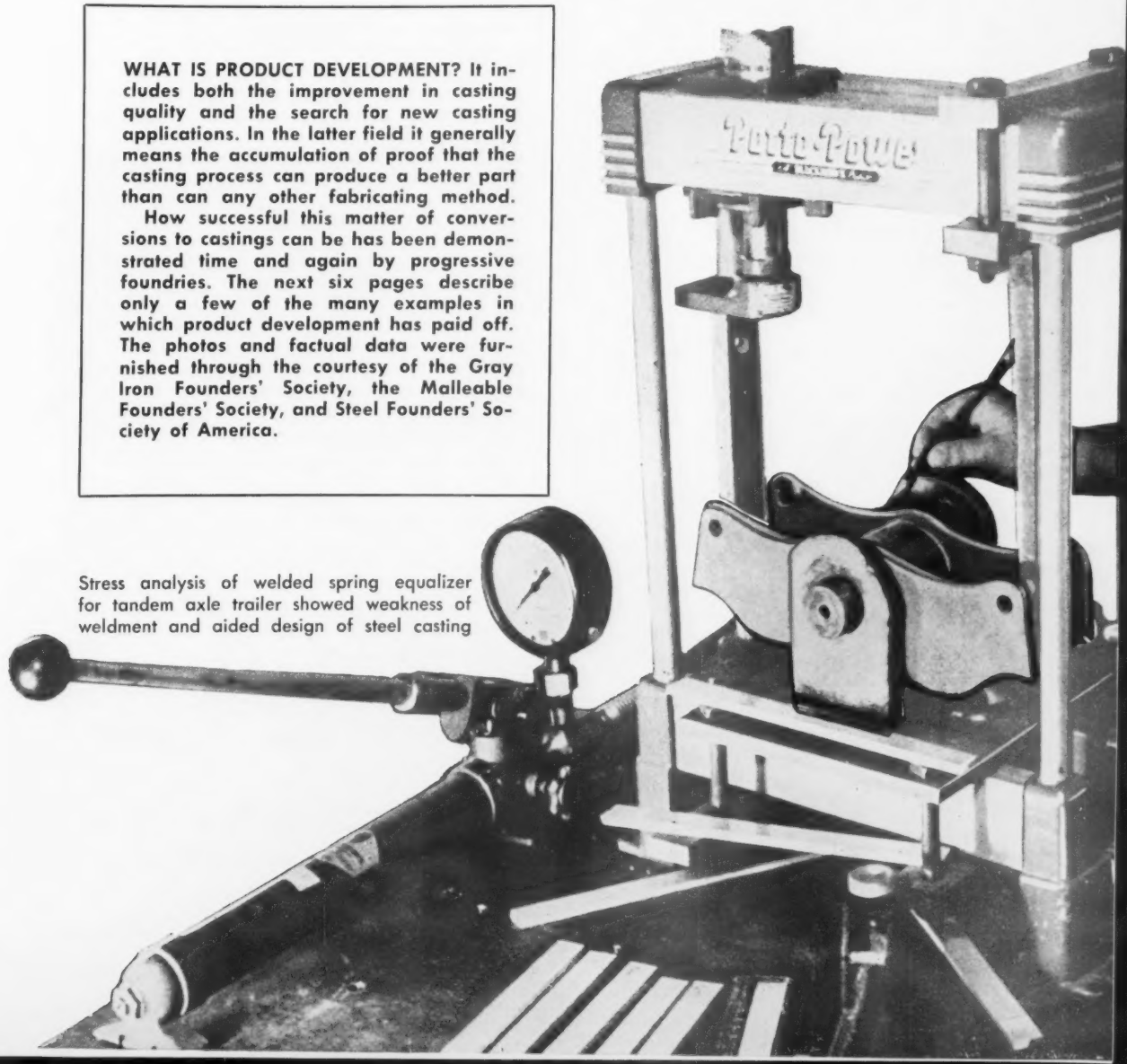
Product Development

On the one hand we have new materials and processes, on the other new information on metals and casting design. These have been covered in another article in this series, and there is no need to catalog them here. What matters is that the awareness of the need for this kind of progress is pretty much accepted by the industry. Individual foundries, their trade and technical associations, and suppliers are engaged in research programs from which will emerge the tools for tomorrow's castings. It is this activity which will enable castings to compete for future markets—in other words, research is an investment in the future of the industry. Industry and government are spending billions of dollars on research. The foundry industry cannot afford to bring up the rear in this respect.

Product Development Wins New Markets—Our

WHAT IS PRODUCT DEVELOPMENT? It includes both the improvement in casting quality and the search for new casting applications. In the latter field it generally means the accumulation of proof that the casting process can produce a better part than can any other fabricating method.

How successful this matter of conversions to castings can be has been demonstrated time and again by progressive foundries. The next six pages describe only a few of the many examples in which product development has paid off. The photos and factual data were furnished through the courtesy of the Gray Iron Founders' Society, the Malleable Founders' Society, and Steel Founders' Society of America.



Stress analysis of welded spring equalizer for tandem axle trailer showed weakness of weldment and aided design of steel casting

discussion of product development will be devoted primarily to conversions to castings from other forms of fabrication. Herein lies the greatest single potential for new markets for the foundry industry.

As we observed earlier, product development also includes improvement of castings and the search for new applications in new products. The first speaks for itself. The second calls for continual vigilance and aggressive competition. If foundries do a good job on the castings they supply customers at any given time, they will be in a good position to win consideration for the use of castings in any new products developed by those customers. Since social and technological change constantly wipe out some of the products wherein castings had found applications, these new markets are vital simply to replace lost ones.

Need for Conversions — The possibilities for conversions are, however, everywhere. It's unfortunate that the foundry industry in the past permitted production of many parts which could —and perhaps even should—have been made as castings to go to such other forms of fabrication as weldments, forgings, stampings, machined parts, etc. Most of these losses went by default more than because of any inherent shortcomings in the casting process. Foundries were content to stand pat at a time when technological progress elsewhere was making it possible to produce by other means parts which previously could be produced only as castings. Now the foundry industry has come to life and seeks to regain this lost business. Only quality production and aggressive selling will do the job for them.

Finding Conversions — Once in a while a lucky foundryman may have a part brought to him to design for conversion to a casting, particularly if he has demonstrated the ability of his plant to produce other quality castings for the manufacturer concerned. Such an event is a cause for gratitude, but it can't be depended on.

Finding conversions calls for work. Every management man in the plant should be on the watch for them, but it's the sales representative who has the greatest opportunity to ferret out conversions.

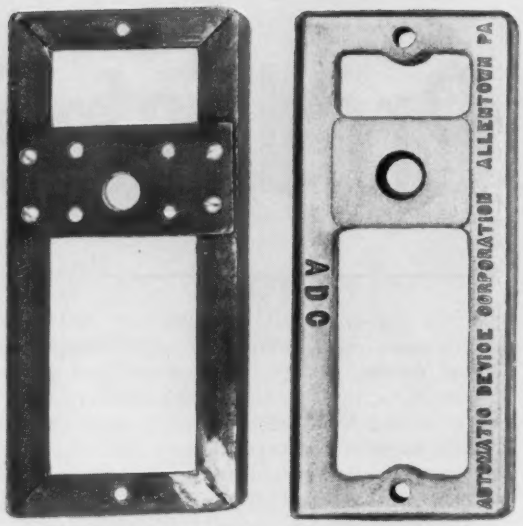
Every company he visits affords an opportunity to uncover this highly desirable business. For one thing, the better the casting salesman knows the products of his customers and prospects, the better chance he has of finding potential conversions and persuading the manufacturer to transform those components to castings.

To this end he should investigate those products at every chance. Here are some typical instances.

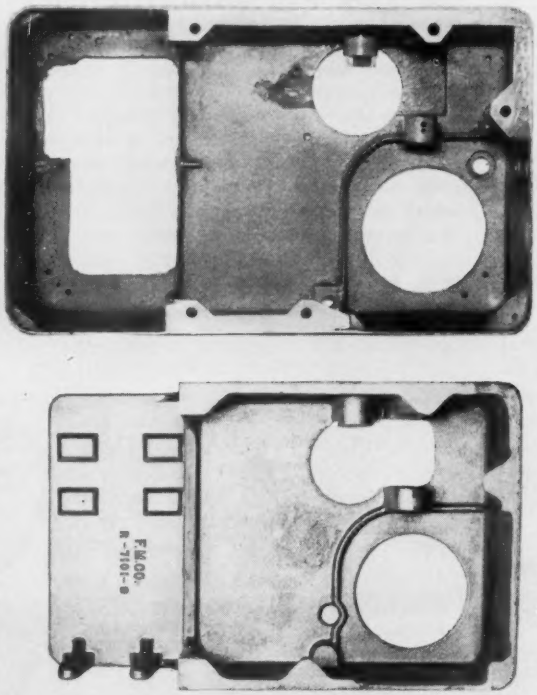
1. Be alert for information about product troubles and failures. Perhaps a casting would eliminate them.

2. On visits to a customer's or prospect's shop, watch for potential conversions to castings which would cut the user's costs, improve his product or otherwise be a candidate for conversion.

3. Examine catalogs, showroom displays, con-

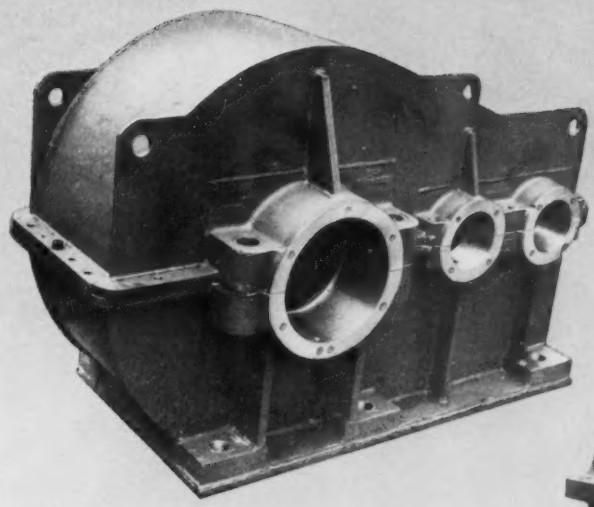


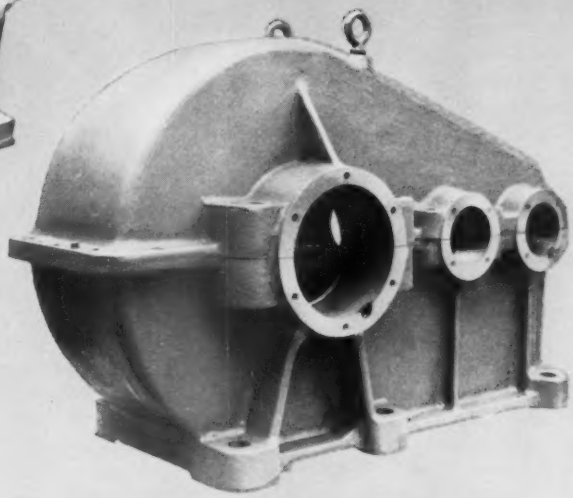
Gray iron motor mount has several advantages over weldment. It cut the cost from $2.40 to $1.10, provided better rigidity and appearance and a simple means of identifying maker



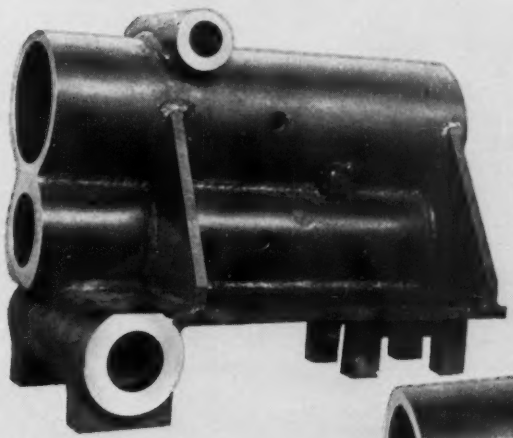
As shown at top, splash trays originally were fabricated and assembled with a bolted-on motor mounting bracket. Gray iron casting cut cost from $32.50 to $15, added rigidity, dampened vibration and cast the motor mount integrally

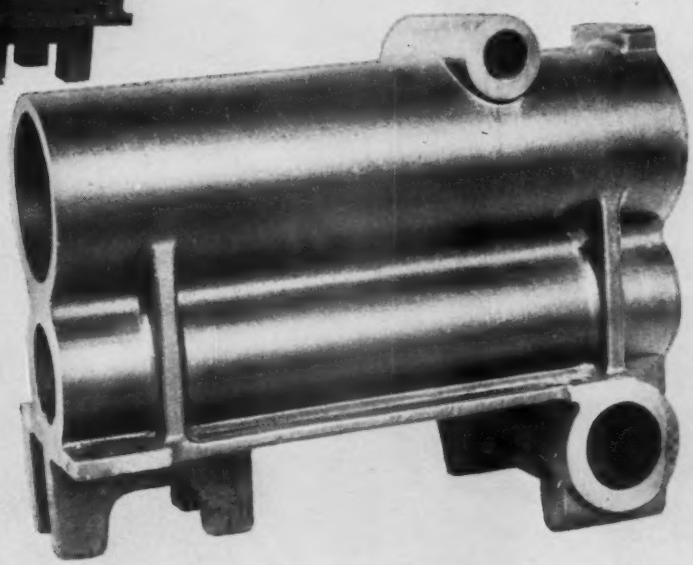
CONVERSIONS TO CASTINGS





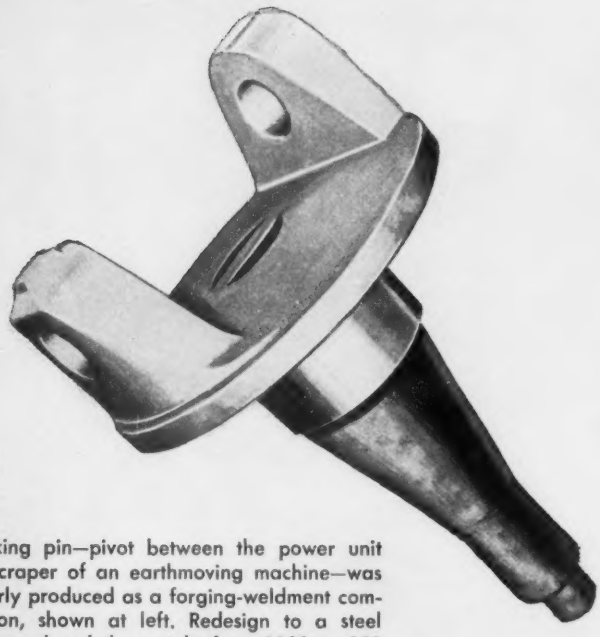
As a fabrication (above), this housing consisted of 69 parts. As two gray iron castings, it was produced with 73 per cent saving on cost of unmachined pieces and 20 per cent saving on cost of machining. In addition, the cast part gave better performance



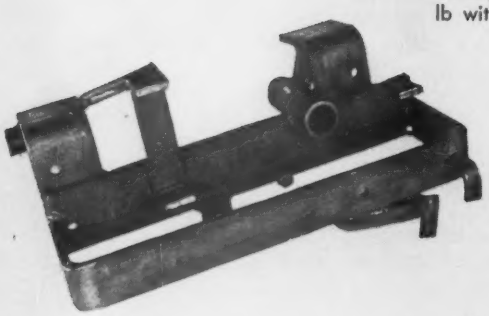


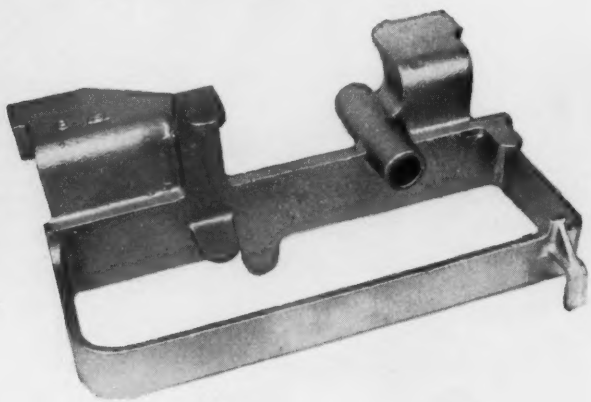
This spindle housing cost $218.57 when made as weldment (left). Gray iron casting was made for $109.67. After amortization of the pattern cost, the savings were still greater

CONVERSIONS TO CASTINGS



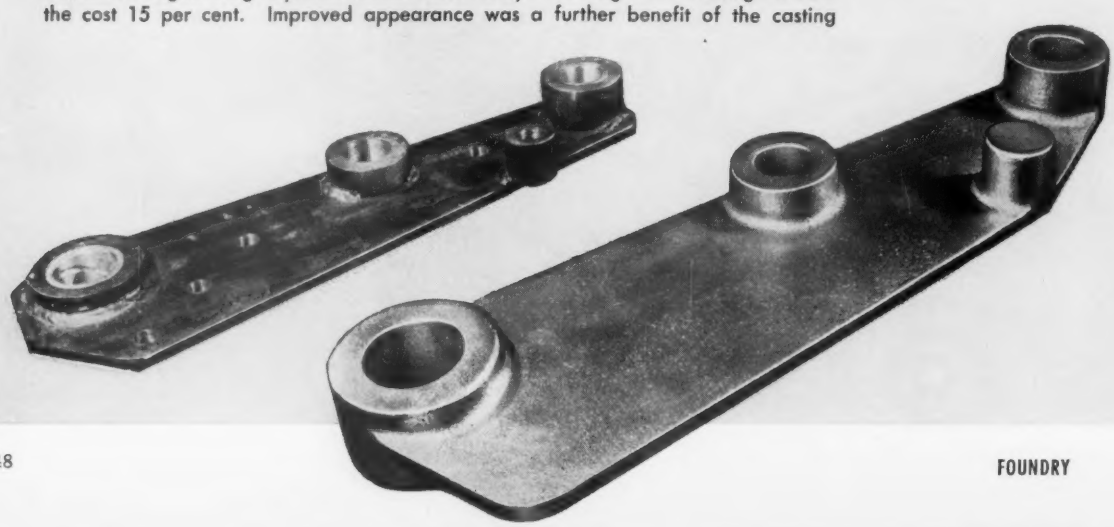
This king pin—pivot between the power unit and scraper of an earthmoving machine—was formerly produced as a forging-weldment combination, shown at left. Redesign to a steel casting reduced the weight from 1100 to 850 lb with equal strength and higher production

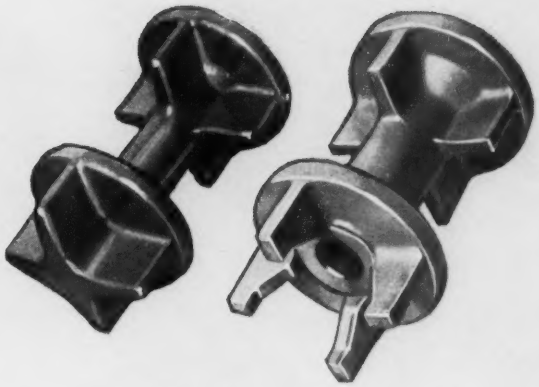




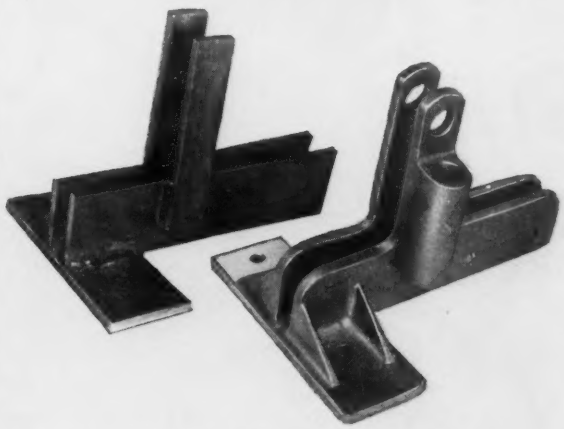
Redesign of this cutter bar frame from a weldment (above) to a steel casting lowered cost of the part 53 per cent and at the same time improved appearance, strength and reliability

Boom hoist frame was produced as a steel casting (at right) through teamwork of customer's engineering department and the foundry. Redesign as a casting reduced the cost 15 per cent. Improved appearance was a further benefit of the casting

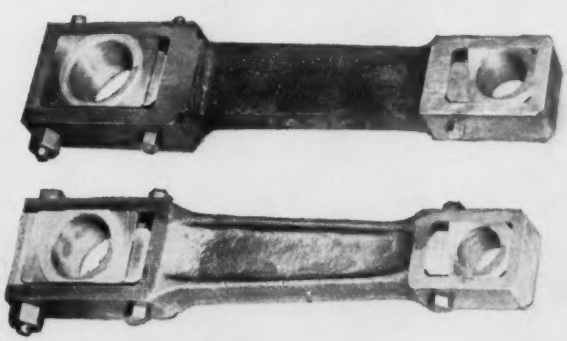




Redesign of the forged plunger at the left to a shell molded steel casting saved 51 per cent of costs before machining, 37 per cent of machining costs, reduced weight 23 per cent and also made available a wide selection of alloys



Cost savings of 48 per cent were only the beginning when this fabricated plow hitch (left) was converted to a steel casting. Accuracy of the casting yielded even greater indirect cost reduction since warpage scrapped many weldments



Conversion of connecting rod from a steel forging (top) to a steel casting cut weight 20 per cent, from 89 to 70½ lb, and the cost 46 per cent

vention exhibits and salesrooms for potential conversions.

4. Discuss further use of castings with customers' designers and engineers whenever possible. Offer your help, and carry through on the offer.

5. When you get a lead, write it up and submit it to the people who ought to know about the idea. Recent surveys indicated that more than 90 per cent of buyers and product engineers not only would welcome such help, but are anxious to have it. Illustrations accompanying this article show many typical examples of conversions to castings. Your company can uncover them, too.

Another point to keep in mind is that it isn't enough to know about the production and costs of castings. Your sales arguments will carry more force if you have some knowledge of the cost of competitive materials and processes when you work with a customer on a new idea.

It's impossible, of course, to work with an individual engineer on each of his products. But to be sure that castings are used wherever they should be, educate him on good casting design. Then he'll do the job for you.

Carrying this line of attack one step farther, some foundries now are holding casting design forums for engineers from customer companies. Banner Iron Works, St. Louis, for example, recently held a one-day forum of this type which was attended by 77 such engineers from as far away as Texas and Pennsylvania. These men left the gathering with definite ideas on how they could convert certain parts to quality castings.

Even more recently, Rosedale Foundry & Machine Co., Pittsburgh, held a similar forum to which it invited more than 100 design engineers. Representatives of 33 companies attended the meeting and heard talks by Rosedale officials on foundry fundamentals, casting defects and their prevention through better design, designing for improved economy, metallurgical aspects of casting design and examples of design improvement and lowered pattern and casting costs. It's neither necessary nor wise to make a sales pitch at one of the affairs. The facts speak for themselves.

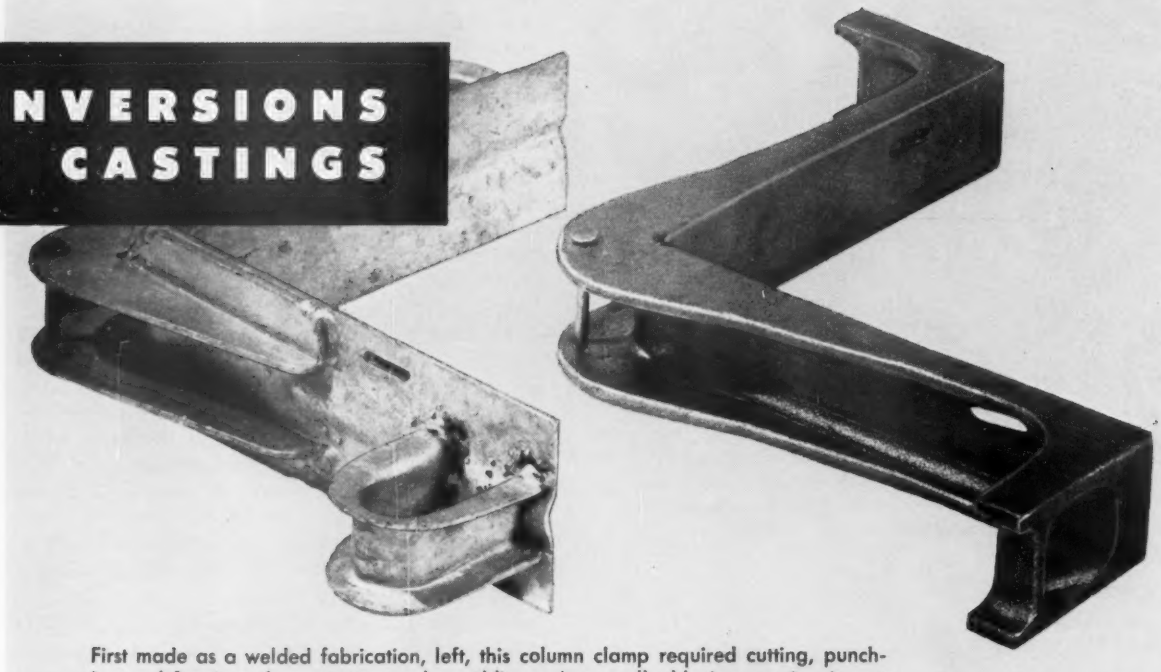
The vital importance of product development work has been recognized by the various foundry trade associations, and these groups are engaged in programs to develop activity in this area. These efforts deserve the support of the entire industry.

Using Design Methods To Sell Castings—One more area should be mentioned in relation to conversions. It applies equally to the design of new parts, but has a double value when conversions are involved because it does two things at once: 1. It can show the weakness of the part in its present form of fabrication. 2. It can aid in the design of a quality casting and demonstrate its superiority.

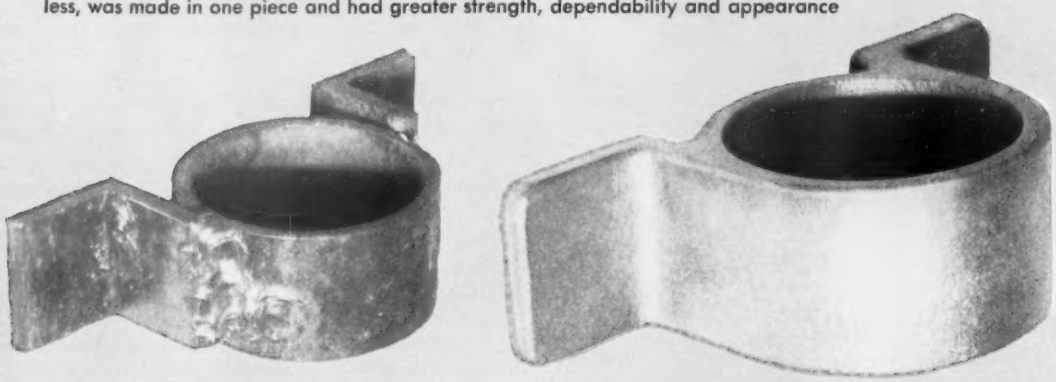
This aspect of design relates to the use of brittle lacquer and electronic strain gages. These nondestructive methods are employed, of course, with parts which undergo stress.

Foundries with facilities for this type of test-

CONVERSIONS TO CASTINGS

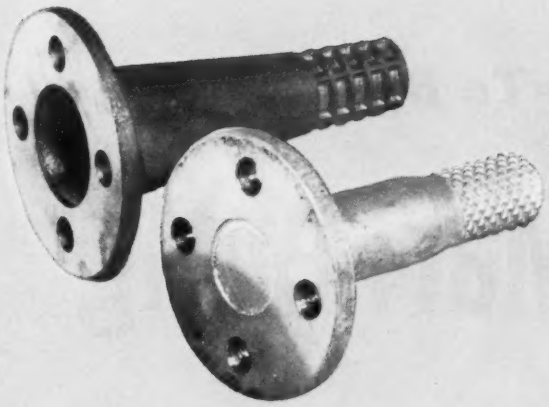


First made as a welded fabrication, left, this column clamp required cutting, punching and forming of many pieces, plus welding. As a malleable iron casting it cost less, was made in one piece and had greater strength, dependability and appearance



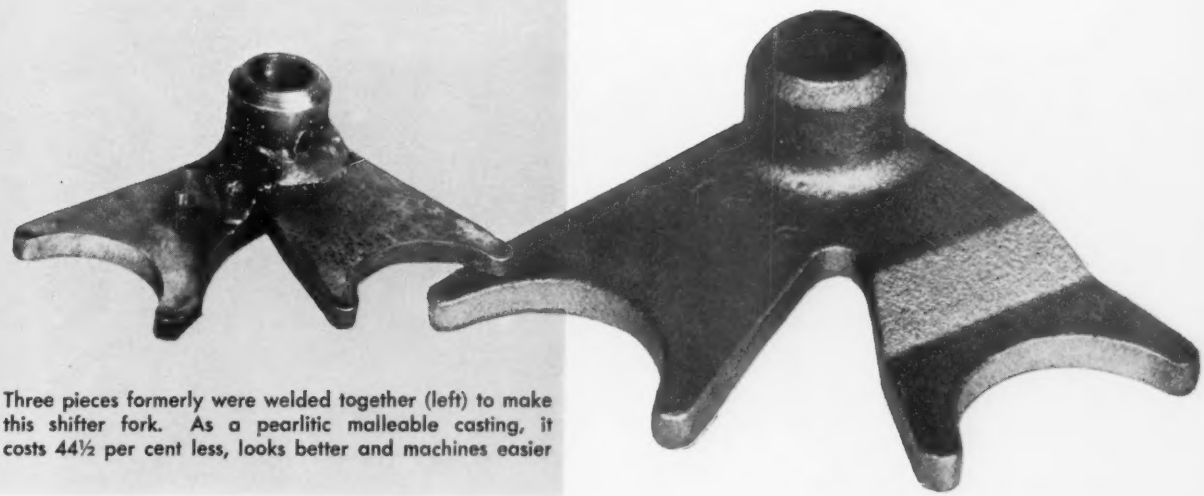
Saw bearing originally was made, left, from a piece of tubing to which two angle sections were welded. As a malleable iron casting it looks better, is more easily machined, has better corrosion resistance, is made in one piece and also costs less

Originally made by cutting, punching, forming and welding (left), this part was redesigned as a malleable casting. Its advantages include complete stress relief, increased strength and improved damping properties



Conversion of solid formed insulator bracket (right) to malleable iron casting cut weight 38 per cent while strength remained same. In addition, the cost was cut, corrosion resistance improved and handling in use facilitated

Plow swivel originally was built up of four pieces, as shown at the left. Redesigned as a malleable casting, it is 20 per cent lighter, looks better and is made at a lower cost



Three pieces formerly were welded together (left) to make this shifter fork. As a pearlitic malleable casting, it costs 44½ per cent less, looks better and machines easier

ing are in a particularly strong position to obtain conversions because they can demonstrate their contention that a casting will outperform the part under consideration.

In such testing, the noncast part is first static-tested with brittle lacquer, which reveals high-stress areas and potential weak points. Then field testing with strain gages confirms the findings of the brittle lacquer. Next, the foundry designs the replacement casting, using the same testing methods, first to make the part better and then to demonstrate its superiority.

A great deal has been done with this sort of program at Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Superior even has produced a 16-minute sound-color film called *The Big Difference* which shows how a steel casting was designed to replace a weldment. This 16-mm film is available for showing without charge. Write on company letterhead to Superior Steel & Malleable Castings Co., Benton Harbor, Mich., and mention the date you want to show the film, the group to whom you want it shown and your name and title. You pay only return postage.

The Time Is Now—Both research and product development loom particularly large at this time because of several factors. Foundrymen must overcome inherited resistance to the use of castings which many product engineers still feel. In addition, what the foundry industry does in these areas will be indicative of whether it is going to be positive and dynamic or whether it will be content to muddle along, just hoping for the best.

Finally, and perhaps most important, we are living in an age of transition, one in which technology is about to break through to a world of new processes and new machinery. What foundrymen do at any one time always affects what they will do in the future. Because of the nature of these times, the impact of the present on the future is likely to be greatly magnified. The foundry industry cannot afford to drag its feet.

How To Build a Marketing

Good marketing practices increase profitable sales. Here's the story on how to build a marketing program tailored to the needs of foundrymen. It is based on activities of successful foundries

SELLING more castings is one of the most important problems facing foundrymen today—so they reported in a recent survey. And it is more important for medium and small-sized foundries than for large ones, which do more of a selling job on the whole.

Every foundryman can do many things to increase sales, but increasing sales just for the sake of raising volume is not always the answer to a more successful business. In fact, in the foundry business, increased sales sometimes have resulted in or at least been accompanied by a reduction in profits. That's one place where marketing—as distinguished from selling—comes in.

Good marketing practices result in the increase of profitable sales. In the foundry field a sound marketing program points to a profitable compro-

At a casting design forum for design engineers held by Rosedale Foundry & Machine Co., Pittsburgh, Paul H. Magnus II, vice president of foundry production at Rosedale, explains exhibit of molds and cores

Program

By RICHARD C. MELOY
Marketing Director
Gray Iron Founders' Society
Cleveland

mise between selling only kinds of castings which you produce most efficiently and selling all of the kinds being bought in your area. Marketing is selling with one eye on the profit and loss statement—not only this year, but in the future as well. It implies a knowledge of what prospects and customers want and a willingness to meet their needs.

Here's the story on how to build a marketing program tailored to the needs of foundrymen. It is based on activities of successful foundries following accepted marketing principles:

1. Sales Analysis—Analyze your sales. What do you do when the scrap on a job you've been making for two years suddenly doubles? You raise hell, but after you blow off, you analyze the job. You check the sand, the pouring, etc. to find the cause. And when your costs are too high on a particular job, what do you do? You break each operation down into its simplest parts and study them to discover how they can be improved—that is, you analyze the job. Similarly, sales can be analyzed too, with equally good results.

List your important customers and your recent billings to them as shown in Fig. 1. Leave room for remarks, and always ask yourself this question: Why aren't they more? Show this breakdown to your key people and ask them for their answers.

Further analysis of sales to individual customers, by pattern, or by groups of castings going into specific products, or by months for the past year or two, often will help you to determine, even better, "Why aren't they more?" If you are not satisfied that you know the answer after internal analysis, ask your customer. *Ask him anyway,* since doing so furnishes you with a good excuse for getting into the next step.

2. Market Analysis—Knowing your potential sales in the future gives you a measure of the opportunity open to you and a logical basis on which to establish sales goals.

Start with Your Customers—Develop a simple form on a card. Fill in the customer's name and past shipments of a few key castings of which you are the sole supplier, as shown in Fig. 2. Express these in physical volume and in terms easy for him to visualize.

Explain that you are doing a little market research, that you are considering the purchase of equipment to help you supply more and better castings and that you want to know more about your potential. Take out the card and compliment him on the fine job he is doing with his new Model 130 machine. Then cover these points on all of his products that use castings: 1. Estimate for 1957—and beyond. 2. New products in planning stage, and how you can help. Next, cover these points: 1. Products not using castings. Could they? 2. Range of properties, coatings, finishes,

CUSTOMER	SHIPMENTS IN THOUSANDS OF DOLLARS 1952	1953	1954	1955	1956	REMARKS
Jones, Inc	35	45	40	20	17	Designed popular model away from iron. Should he use it, check new product lines
Smith Co.	22	25	20	28	36	Slipping in their industry?
ABC	140	122	100	106	102	???
XYZ	260	200	210	148	116	
Land M	80	102	100	130	198	Insist on 2 sources for wheels.

Fig. 1—(above)—To analyze your sales, you might use a form of this type. Such a breakdown of data shows what can be improved

Fig. 2—(below)—Use a card form like this to analyze your markets. Knowledge of your markets helps you establish sales goals

MARKET ANALYSIS

CUSTOMER _____ DATE _____

PART	PRODUCT	SHIPMENTS 1954	1955	1956	1957	ESTIMATED REQUIREMENTS REMARKS
Housing	Gear Reduction	300	380	408		
"	" "	1860	2140	2600		
Blade	Model 130	—	260	720		

TECHNICAL
DATA
AS IT APPLIES TO THE MANUFACTURE AND USE OF MODERN GRAY IRON AND ALLOY CASTINGS.
EMMAUS FOUNDRY AND MACHINE CO. INC.
EMMAUS PENNA

Monthly direct mail pieces were so popular with customers of Emmaus Foundry & Machine Co., Emmaus, Pa., that they were bound into a booklet

etc. 3. What you have been doing to improve quality. 4. Special services you offer, with specific examples. (Don't let the opportunity go by to do a little selling at the same time you are researching!)

Other Castings Users—These firms may be in your area or in an industry you serve in a special way. Object: To learn how much business there is broken down by types and sizes of castings.

Probably the best way to get this information is with a simple, one-page letter questionnaire mailed to a broad list. Enclose a stamped, addressed reply envelope with each. A midwestern gray iron foundry recently sent such a questionnaire to all companies in certain metalworking industries in a five-county area and received a 46 per cent return, 90 per cent of which were signed. In addition to the market data this kind of survey provides, you also will have an excellent prospect list! A market research agency could handle this job for you on an anonymous basis or on your letterhead. There are advantages to either method.

Lists are available through mailing list companies, business publications (only to advertisers, generally, and the list cannot be checked against your customer list), directories such as Thomas' Register, trade associations, chambers of commerce, state departments of commerce and classified telephone books. The reference book of Dun & Bradstreet, published every two months, lists manufacturers and their principal products.

If you have a special problem, the mail survey technique is particularly effective. For example, if you are considering shell molding, pouring a special alloy material or just looking for more business in a limited field, a broad survey can pinpoint your prospects. One foundryman making chilled iron car wheels had all orders suspended for 18 months. He sent a questionnaire to 230 companies in a three-county area which might use chilled iron wheels in their products. He located 12 prospects, developed 6 into customers and stayed in business.

On the other hand, if you are looking for potential which can be developed into immediate business, the personal interview or telephone approach may be used to good advantage. With this method, the prospects usually can be completely qualified—and sometimes sold. One foundry started out to make a survey of this kind and filled its capacity with the business it uncovered in just three calls!

3. Profit Analysis—The step assumes a sound cost system. The object of this analysis is to see just which types of castings you can produce most efficiently. What they are can be measured roughly by a study of profits since prices are, for the most part, set by competition. Most foundries concentrate on certain types of castings. Few if any can do a competitive job on all types. You may be set up to produce one type of casting much more efficiently than a neighboring foundryman, who in turn can run circles around you on another type. Face the facts where they count the most—on the profit sheet.

Classify individual castings by size, by method of production, type, quantity of order, complexity of casting, etc., and study the *profit per sales dollar* in each group. Another way would be to list all important jobs in descending order of profit per sales dollar and see whether the more profitable fall into certain categories. Then your objectives become clear—either increase your business on certain types of jobs or improve your operations on other types (to improve their profit picture) or both. Now you are ready to set sales goals and establish a marketing program.

4. The Marketing Program—With the foregoing studies before you, sound planning for the long term should be a comparatively easy job. For example, suppose that you have decided that your most effective range is 100 to 300-lb castings in quantities up to 5000 per month and in strengths up to 40,000 psi. The next most efficient range is 300 to 1500-lb castings. On castings under 50 lb however, you barely break even.

Then, if your sales and market analyses show that you are getting only 10 per cent of the 100 to 300-lb castings business in your area, your program is clear: Improve quality and service, and get out and sell!

On the other hand, if most of the potential business is in small castings (or special alloys or whatnot), you may decide to put in equipment which will enable you to go after that business.

Or you may investigate further to see if you can expand your marketing area to sell more of the kind of castings you make most efficiently.

Deciding on the best marketing program calls for knowledge of what business is available and what kind of business you can do with profit. You have certain natural advantages (or you wouldn't still be in the business). Play these to the limit before getting into an unknown field. At the same time, include the new field in your long-range planning if you feel confident of the potential it offers. The marketing program is a statement of your business goals. It is no better than the facts on which it is based. Plan carefully: You can achieve any reasonable sales goals by intelligent application of the following suggestions.

5. The Selling Theme—Your selling theme is a logical development of your marketing program. First, go over the reports of your market research calls or recent sales calls on customers. List the things they would like to see you do better. Next, put down every possible argument and reason why your customers and potential customers should buy the castings *which you most want to sell them.*

From these lists—and with a knowledge of your competition and of your own failings, if any—decide on the general theme or themes you believe will be most effective. Develop a statement of policy and a slogan around this theme. Plug your theme everywhere you go and in all your advertising and sales promotion. Above all, be prepared to back up your claims!

Tell your employees about it, and sell them on the importance of establishing your company as tops when it comes to furnishing the quality or service on which your sales are based. Superior Foundry Inc., Cleveland, for example, sponsored this one: "Our quality is the same as our name."

6. Selling Program—This program will be designed around your selling theme with the purpose of realizing your marketing goals. It can be strengthened or held back in scope as the occasion demands.

Customer Contacts—Buyers tell us they would like to see castings suppliers oftener. To make your calls effective, however, have a definite purpose for making them, based on your selling and marketing programs and on the principle of of-

WHY BUILD A MARKETING PROGRAM?

This is the best reason why you should build a marketing program, if you don't have one already: *It is your only sound assurance that you will be in business five years from now.*

More than one foundryman has gone out of business because, after years of consistent orders from one or two good customers, he was lulled into believing he had a market that no one could take away from him. Maybe he was right, that no one person could take it away, but many other factors can cause a castings business to evaporate. In fact, there are too many to keep track of. Consider these:

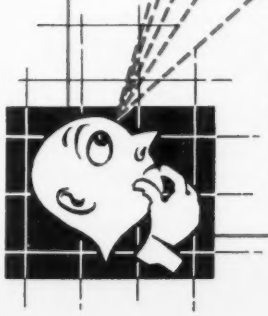
New materials—How many markets for castings have been lost to other materials?

New products—Electric ranges, rotary power lawn mowers, automatic water heaters are a few of the many new products which use less castings than the old products they are replacing.

New processes—Volume production may justify more expensive tooling which will produce substitutes for castings at lower cost.

Competition—This factor might force your customer out of business or into another business where he wouldn't use castings.

Mergers, strikes, fires, etc.—These and other possibilities could affect your customers and your business with them.



With these possible forces working to cut your castings business, it is a good feeling to have a reservoir of new business from which to draw. This can be provided by following through on a well planned marketing program. Consider also that other foundries are developing marketing programs. The idea that you *can sell* castings is catching on.

Finally, a well-planned marketing program can put you on a rising sales curve of profitable business.

fering help or service to the customer. Consider taking him a piece of technical literature reprints related to his problems or ad reprints showing savings by conversion to castings. Your trade association or FOUNDRY probably will be able to supply you with appropriate reprints.

One foundry sales manager wrote one of his most important customers that he would like to make an appointment. He said that he planned to bring his quality control man, who also would like to visit the customer's shop superintendent to check at first hand the quality of castings as they were machined. He also was going to bring the sales representative assigned to this account so that they could get acquainted with the man who would handle their orders and expedite shipments when the sales manager was out of town. The purchasing agent was so surprised and pleased that he telephoned the next day to say he was setting up a conference of his people who were concerned to clear up all misunderstandings and get on a firm foundation with this castings supplier.

This approach is a splendid way to cement relations and increase your stature; but be sure you are prepared when you go into one of these meetings, or you may leave your shirt behind. That's why it's better for you to take the initiative in setting up such a meeting than to wait until your customer does. In any event, however, take an agenda with you. Type up enough copies for everyone there and try to settle every point on the agenda. Take facts and figures to back up your points.

The best thing you can take your customer is a suggestion for improving or lowering the cost of *his* product. Always ask for the order. When you get it, leave.

Prospect Calls—The above advice applies also to prospects. In addition, since they don't know by experience what a good service you render, sell your program a little harder. Refer the prospect to a good customer; produce testimonials.

Product Development—When you establish your marketing program, you make a decision about your product development program, too. If you decide to upgrade your castings, that decision is an important part of your sales story. Play it for all it's worth.

If you make castings which you sell as finished products, product development can pay off in increased sales and profits. For many years the Shakopee Foundry Co., Shakopee, Minn., has been supplying boat anchors in the surrounding lake area. To serve owners of plastic boats and particular sailors better, this foundry developed a rubberized coating and added nonscratch anchors to its line. Result: Increased sales at a higher rate of profit.

Product development for your customers' products is a field open to all foundries and can prove to be a real "Operation Bootstrap" for you and the foundry industry.

The mechanics of this business-creating method are described elsewhere in this issue of FOUNDRY

and deserve special study. Some very successful foundries develop profitable new business this way, and it is surprising that more foundries don't do more of it.

Customers would like suggestions from their foundries on the design or redesign of their products to achieve lower costs or improved quality. In two recent surveys conducted by the Gray Iron Founders' Society, 92 per cent of the buyers and 92 per cent of the product engineers who replied stated that they would appreciate such assistance. One good castings buyer wrote, "In my opinion, this is a foundry's best opportunity to obtain new business."

Advertising—The value of advertising as a selling tool is pretty obvious: Billions are spent on it every year by American industry. For foundries, the question is what it can do for the individual company. Size of foundry and the nature and location of its potential markets are the factors to be considered. The answers to these questions should help you to determine whether to advertise, where to start and how much money to spend.

A company with national or large regional markets, for example, probably would use a national business publication which covers the potential customers. A smaller foundry probably would settle for publications which reach consumers in its own area. Specialized markets call for specialized media. The various trade associations advertise in national business papers. Whereas individual foundries are likely to stress quality of their castings and their facilities and services, the associations point out applications of their members' products and their advantages. Publication advertising frequently is used in conjunction with direct mail, the one supplementing the other. Reprints of ads can be used as direct mail themselves.

Keep in mind about advertising that you should

The foundry trade associations have given real impetus to the development of better marketing practices. Shown here is a meeting of the marketing committee of the Gray Iron Founders' Society. At the far right is Richard C. Meloy, who is the author of this article and marketing director of GIFS

not expect it to produce orders. It can, however, do the next best thing—help to produce inquiries and interest which will keep your salesmen employed twice as profitably as they would be otherwise. In addition, by doing a preliminary selling job, advertising helps open doors to salesmen.

These facts begin to suggest what you should do about advertising. Start by getting your message to the prospects whom you most would like to reach. Spend only enough to keep your salesmen busy with the good inquiries it produces—busy, that is, after they have taken care of your present customers.

Many foundries find that getting their message to specific prospects is done most efficiently by direct mail, which is particularly suited for establishing direct contact with known markets and known prospects within those markets. It is a tool which when properly used can achieve striking results. Improperly applied, it can be a far more expensive medium than business-paper advertising.

Hunt-Spiller Mfg. Corp., Boston, develops 45 per cent of its new business through a merchandising program built around direct mail. Here's how it does it: A mailing is sent quarterly to lists of firms with products which indicate that their castings requirements would be compatible with Hunt-Spiller's facilities. These lists also include customers and are revised annually. The mailing consists of an illustrated example of how Hunt-Spiller has helped a customer save money or a questionnaire on the prospect's requirements or a selling piece on the advantages of using castings. A return postcard always is included and more information offered.

Returns are followed up by personal sales calls and these by letters from the sales manager reviewing the advantages of doing business with Hunt-Spiller. Calls are continued if potential business fits, and the emphasis is on final cost of castings to customer rather than on price. Prospects are invited to visit the foundry. Ninety per cent of worthwhile inquiries are sold within 3 years. Hunt-Spiller squeezes every bit of good out of the mailings by posting copies on bulletin boards to encourage everyone in the plant to look for ways to save money for customers.

One large foundry, primarily captive, also finds direct mail effective. General Electric sends interdepartmental letters and sales brochures once or twice a month describing advantages of the various types of castings it produces and furnishing design helps.

Emmaus Foundry & Machine Co., Emmaus, Pa., did such an effective job with a series of monthly three and four-page letters that it had to have them printed and bound into a small book which it sold at cost ($1 apiece). These letters discussed various phases of foundry operation and gave hints on how to do a better job of purchasing castings to buyers and design suggestions to engineers. Emmaus started with a mailing list of 75, but requests for these letters built it up to 800 over a three-year period. Much profitable new business has been directly traceable to this direct mail program. William S. Thomas, executive vice president of Emmaus Foundry, offers to send a copy of his technical data book to any foundry which is interested.

Finally, Carondelet Foundry Co., St. Louis, saw a growing market and deliberately went after it on a seminational scale through a direct mail campaign. A business publication furnished a directory of personnel at all plants. Direct mail was developed after calls at nearby plants and a study of technical literature on the prospect industry. Return postcards offered publications Carondelet had available. Response to direct mail in this entirely new field totaled 38 per cent in a year. The best prospects were sold first, through sales calls, and the experience gained in this particular high-alloy application made it easier to sell other prospects.

This last example illustrates a situation in which business publication advertising may prove a valuable sales aid. Other foundries use local purchasing agents' papers, chamber of commerce magazines, directories, programs, etc. A good industrial advertising agency can advise on these

media, and it probably will pay to employ an agency if you develop another important sales aid—a catalog.

A recent survey discloses that most large foundries, but only a few small ones, have brochures or catalogs which picture the types of castings they produce and describe their facilities. A catalog built around your over-all program can help greatly to keep sales calls in the right channels and to build prestige and salesman pride in the foundry. It also can be used as an immediate follow-up to direct mail inquiries before the salesman calls. Other advertising being done by foundries includes display ads in classified telephone books and on billboards and foundry signs.

Sales Policies—Do you use expediency or good business practices? Does your branch of the foundry industry have a set of terms and conditions of sale? Ask your trade association.

Do you ship FOB the foundry? Make terms 30 days, net? Insist on return of defective castings within 90 days? Do you adjust piece price after actual weight is known? Refuse to make castings with improper patterns and equipment? Have clear understanding on responsibility regarding variations between blueprints and patterns? Make it clear to customer that safety of patterns is his responsibility? Do you take a nostalgic view of inactive patterns and give them loving care and valuable warehouse space even after your customer possibly has written them off and forgotten about them?

Good practices—fair to foundry and customer—can be sold. Decide what terms you would like to live with, and convince your customer they are best for him too. Then you can have a clear understanding on any special variation from your standard terms. Make the variation the exception, rather than the rule.

Services—Buyers tell us there is room for improvement in the services that foundries render. Make sure that you tell your customer when a pattern needs repair. More important, look for changes in pattern equipment which can lower casting cost.

Keep your inspectors alert so that obviously defective castings are not delivered. Maintain the customer's schedules, but if you foresee that you will fall behind, let him know ahead of time. Remember that he has schedules to meet, too, and that they may be more important than yours. If he knows in advance, he probably can revise his releases to you in order to keep his operations running smoothly. Don't let one of your customers repeat what a large casting buyer in the East recently said: "Foundries rarely notify you when they are having trouble with a job, but blunder along, causing havoc with production schedules."

Know your customer's requirements and problems so that you can gear your operations closer to his. This paid off handsomely for an Indiana foundry which cut its overtime labor expense from nearly $500 per week to $50 per week over a three-year period. A principal factor in this saving was more frequent contact with customers to learn their requirements.

Look for other services you can supply your customers—heat treating, grinding locating pads, machining, special finishes on castings, etc.

Sales Promotion—Let your imagination go. Publicity often counts for more than advertising—and at practically no cost. You get publicity when you do something newsworthy and tell your newspaper or chamber of commerce about it. You get the best kind of publicity when you have an article on casting design or processing or foundry operation published in a business publication. Reprints make excellent direct mail pieces, set you up as an authority. So do speeches at luncheon clubs or at other gatherings.

Castings displays can be used in many ways. Start one out in your office lobby; adapt it to shows or space in your bank; or loan it to schools.

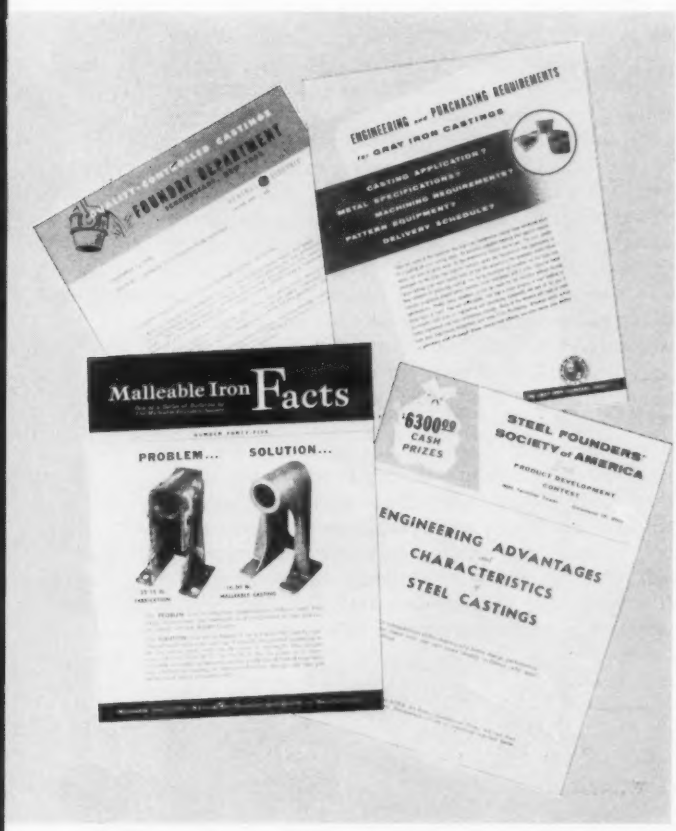
Plan plant visits for selected customers, followed by dinner. Electric Steel Foundry Co., Portland, Oreg., takes all of its customers into its plant to meet different employees every month—

Business magazine advertising is coming into increasing use as a foundry selling tool. In this illustration are shown typical advertisements of a foundry and of trade associations

in effect—by sending them its employees' magazine. This practice actually has sold castings. They state, "A carefully edited magazine, written for and by employees, balanced as to gossip, humor, technical, and educational material, becomes the best institutional advertising. . . Customers feel that they are looking in a window observing what is going on in your kitchen."

Other foundries remember their customers with Christmas gifts (often casting novelties) or calendars. Would a telephone listing in out-of-town telephone books pay off?

Sales Force—Sales or foundry *engineers* are highly recommended by many outstanding foundries. They also are requested by customers. To be helpful to customers, sales personnel should be well versed in foundry operations. They should know design and be able to show customers how and where to use castings. Here is how Northern Malleable Iron Co., St. Paul, underscores this point: "Our organization is thoroughly convinced that the prime necessity in starting a marketing program for a foundry is to develop an adequate sales engineering department. We have four sales engineers who have the ability to visualize how a part can be made by casting and frequently draw up the actual design of the casting to submit to the customer. They also have the ability to go out into our customers' plants and visualize where castings can be substituted for other types of materials."



Direct mail advertising is another selling tool which can bring effective results, particularly to specific, known prospects. Here are typical trade association and foundry direct mail pieces

Your sales force should be trained. Show them how to sell your castings. School them in your policies, define their responsibilities, set sales goals or quotas. Give them recognition for accomplishment, and back them up. They represent you to the person most important to your business—your customer. The sales force should be large enough to give helpful service to every important customer at least once a month and to call on new prospects as well.

If certain specialties are sold on a nationwide basis, representatives may be the best answer. Don't depend on manufacturer's agents, however, unless you are able to locate good ones and to train them.

Follow Through—Keep these points in mind: A good supervisor is a good checker-upper. Set your goals high, but insist on reasonable progress toward them. Furnish your sales department the tools they need. Hold to principles; vary your techniques. A change of pace keeps everyone on his toes. Study economic trends and competitive materials; watch for new markets.

Changing conditions demand a new look occasionally. Dalton Foundries, Warsaw, Ind., list by industry all of their important customers, then record the sales forecast and actual sales for the previous year as well as the forecast for the current year by quarters. Totals are compared with capacity to determine the new business required. The forecasts are revised quarterly after discussions with customers about their future requirements and plans. Thus they quickly and continuously catch changes in trends in time to prepare for them.

What is your next step? When you are rendering a good service and your program is on schedule, plan ahead.

The End Result—That's it: A marketing program which describes how to increase profitable business for your foundry and cites examples of how other foundries are doing some of them. Check it against your own program and keep in mind that the more foundries which get behind a well thought out marketing program, the better business will be for all foundries.

The end result will be that we will begin to serve our customers better, and we will do more constructive selling and product development, which in turn will open up new possibilities and uses for our products. Teamwork will develop as new uses are discovered, and foundries will recommend each other for jobs they can't handle—or can't handle as efficiently as others. The important thing is that overall, the casting process will become better known and foundries will be better able to withstand the inroads of competitive materials and processes.

How We Sell

. . . A Case Study

Business exists for foundries that really want to get out and sell castings. Here's how one foundry has done the job through trained sales engineers and the use of new production methods and equipment

By T. J. KIRBY, D. B. FULTON and J. R. ENTENMANN
Sales Engineers
Northern Malleable Iron Co.
St. Paul

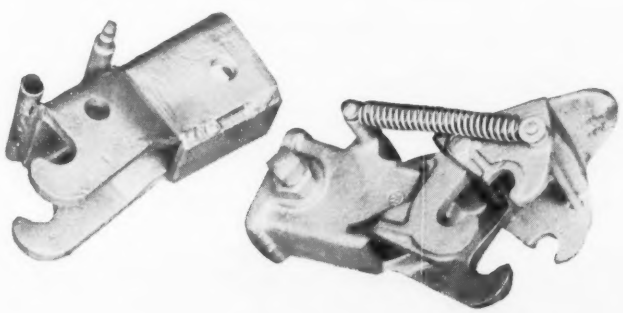
IN recent years, foundries have had to realize that unless they make a definite effort to sell castings, their share of the market will go to other processes. For decades, foundries lacked sales programs. Their business resulted simply from the demands of casting users. No other process was available to provide the shapes which could be cast, and the customer was treated accordingly. Then the modern techniques of metallurgy proceeded to take customers away.

Steels became available which could be forged to intricate shapes and made into unusual stamped forms. Modern welding machines and welding rods were developed which permitted welders to form many of the shapes previously available only as castings. Profile flame cutters were designed to shape multiple pieces with a precise uniformity possible before only in a casting. Technicians of the machine tool industry created machines which made parts from mill products that only the foundryman could provide before. These changes occurred in spite of the many advantages of castings—only because the majority of the foundry industry was not concentrating on new sales techniques and organizing complete sales programs.

Sales Programs—Not all of the foundries in the country stood idly by, watching their present and potential customers leave them. They developed sales programs with definite objectives for their individual concerns, and they supported market development groups in their particular foundry societies. But only those who participated and worked for these goals benefited from the results. The others complained about poor sales. Ultimately, these less progressive foundries close their doors, as many have, unless they come to the full realization that business *does* exist for foundries that want to go out and really sell. Our company is trying to do that selling job, and this article describes how we have gone about it.

The sales program should co-ordinate efforts of the individual foundry with the sales promotion activity of the industry. In recent years, considerable progress has been made in improving manufacturing processes in foundries. The same sort of effort should be expended to develop the sales department so that it utilizes these facilities to the full in sales work. Sales tools such as advertising, literature, etc., are important, but they are only tools. To sell and promote our product properly today, we must have sales engineers to represent our companies.

As a result of technical advances and the complexities of industry, customers' personnel setups have changed drastically from what they were 20 years ago. Many are specialists in their fields, and we must have sales engineers who can represent our companies intelligently in working with these people to sell our product. For this reason, no sales department ever will be effective unless it



Castings

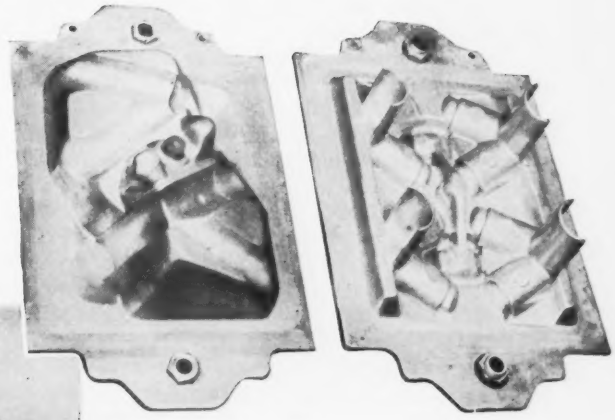
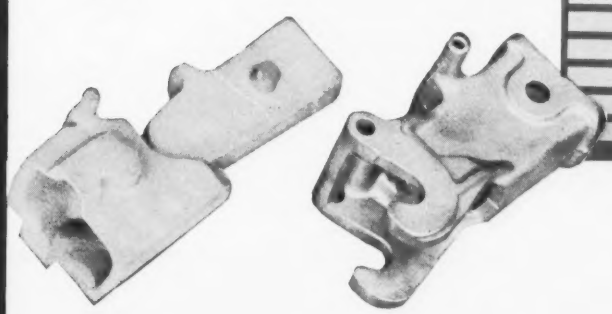


Fig. 1—Castings made from pattern on left, to the customer's specifications, were not competitive. Redesign, using pattern on right, cut cost 46 per cent

Fig. 2—Illustration shows some of selling tools sales engineers have found of value. They include both photographs and samples of castings made by the firm, plus direct mail pieces, handbooks and similar material

Fig. 3—One of the best ways to sell customers on a foundry is to have them visit the plant, where they can see the work schedule (above) and meet personnel

Fig. 4—Conversion from weldment to malleable casting required shell core. Left to right, weldment, completed assembly, core and casting, with hook and pivot for cap



is staffed by sales engineers who are technically trained for the job.

Sales Engineering — Most product engineering staff members are conversant with casting uses and the physical properties of the more common metals. Often their earlier technical training scarcely touched on foundry procedure and casting design. It is the responsibility of a well qualified foundry sales engineer to inform them of the very basic principles of casting technology. Recommendations regarding the elimination of nonfunctional cores, blending of uneven metal sections, proper fillets and tolerances should be made at the "drawing board stage."

For example, we made cast corner sockets with left pattern in Fig. 1 to the specifications submitted by our customer. It developed that these units were not competitive with similar playground swings.

Our sales engineer, working with the manufacturer, redesigned the part, using pattern at right and enabled the foundry to mold the castings more economically. This change resulted in a weight reduction of ¾ lb per unit and a cost saving of approximately 46 per cent.

The sales engineer should be able to anticipate the pattern layout and gating. He should be able to question the designer regarding locating points for machining, pattern draft, gating pads, etc., to minimize difficulties that occur in early production because these details have been overlooked. Even the mislocation of raised part numbers and monograms can cause expensive rework because of interference of mating parts.

In larger corporations, methods departments—staffed by technical people—have been established to develop better procedures. Cost reduction committees with personnel from purchasing, engineering and manufacturing search for design changes and material substitutions which will make their product better and more competitive. The foundry sales engineer has the big job of educating these people, and the opportunity to develop their confidence in his advice is unlimited. To promote the advantages of castings intelligently, he must have knowledge of how competitive processes function. For small customers, the sales engineer can be effective as a "one-man" methods department and cost reduction committee.

To sell his foundry, the sales engineer must acquaint the proper person or persons with its products and facilities. He must, of course, start with the purchasing agent, who is interested in prices and service. The purchasing agent must know on what items the sales engineer is working and whom he is seeing within the company. The engineering department designs the part and specifies the material to be used, and few purchasing agents ever will change a process or material unless it is not available.

Both the purchasing and engineering departments should be kept aware of the technical progress being made by the foundry. If a company has facilities for such newer production methods as shell molding and coremaking, CO_2 coremaking, permanent molding, etc., the sales engineer should be thoroughly familiar with these processes so that their applications can be promoted.

The sales engineer should question the purchasing and engineering departments about whether or not they use weldments, stampings, forgings or other means of fabricating their parts. He then should make every effort to get out into the plant and see what is actually being used. The importance of examining the customer's product thoroughly cannot be overemphasized. It is in this area that most conversions are possible.

The sales engineer can evaluate the various parts of the product as to their present or future potential as castings. Making the inspection with the designer often opens other possibilities because of contemplated charges. Conversations with the cus-

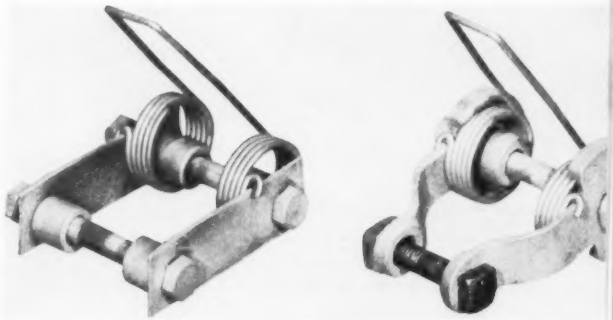
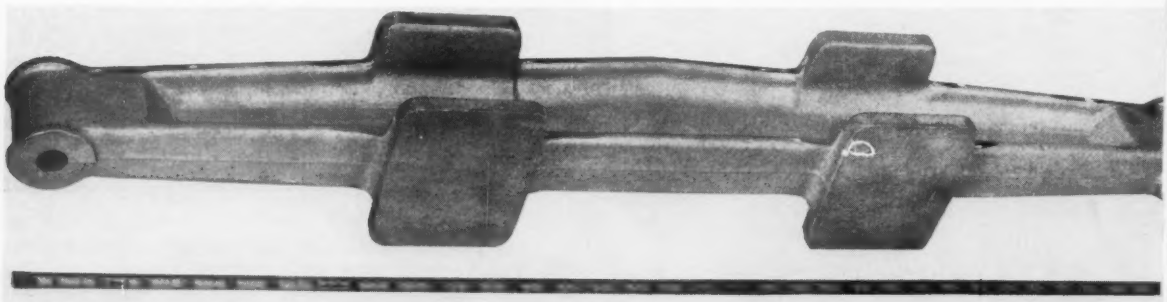


Fig. 5—Casting, right, to replace fabrication was designed with customer-foundry co-operation

Fig. 6 (below)—Axle cost $23 as forging-weldment. Cost of one-piece casting is only $12.50



tomer's engineers also often disclose whether there are possibilities for applications on new items. A good measure of the effectiveness of sales engineers is how well they know their customers' products.

The area covered by the sales department should be well planned. The territories can be developed by consulting industrial publications, state business bureaus, chambers of commerce and past accounts. Casting prospects should be rated by their potential, and the sales engineer should concentrate his efforts and plan his calls accordingly. Some companies may have ideal manufacturing facilities in the metal field, but have no legitimate use for castings in their product. These companies should be contacted periodically to take advantage of potential tonnage through their development of new products. We have found that if a routine schedule is developed, the customer will prepare for the sales engineer's visit.

Selling castings cannot be done at a desk. It can be done only by making regular calls, in both good times and bad. It is as important to call on customers when the foundry is busy as when it is slow. Take sufficient time to satisfy their interest and inquiries, but do not waste their time. When making calls, the sales engineer should know, in detail, the status of his customer's casting and pattern orders. He should check with all departments concerned with the product. Sales engineering includes soliciting and correcting minor difficulties with the customer. In this manner, major complaints often can be prevented.

Displaying genuine interest in a customer's problems will help him to understand foundry problems, and mutual satisfactory solutions can be found. When new castings are delivered, the customer should be contacted to be sure they meet his speci-

Fig. 7—Bottom, original design. Left, center row, redesign. Right, in center row, a similar casting. Top row, weldments converted to castings. Center, D-process core for all castings

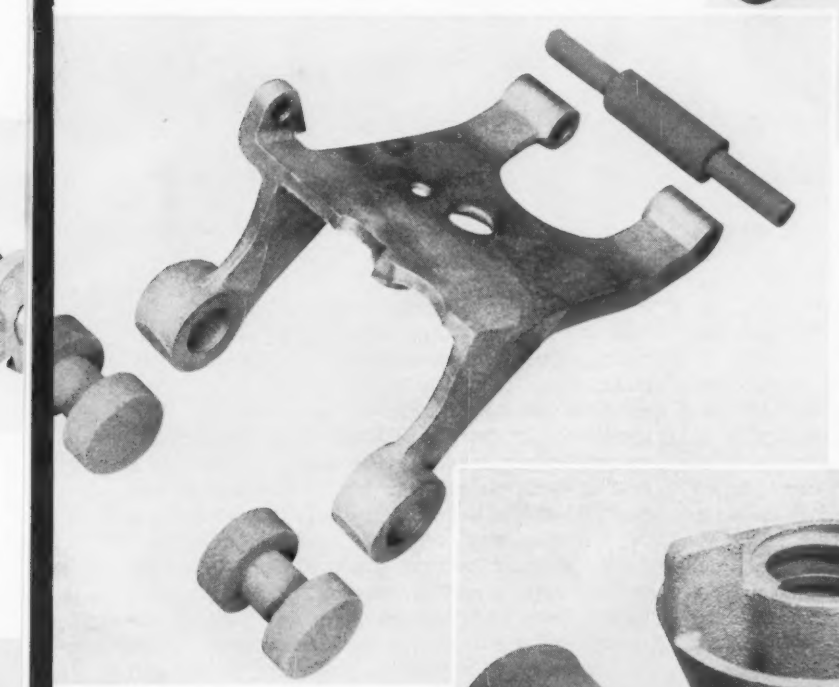


Fig. 8—Another example of cost reduction through use of D-process cores for close-tolerance work. Original estimate of cost was $3.50 per part. Actual production cost of part was $1.50

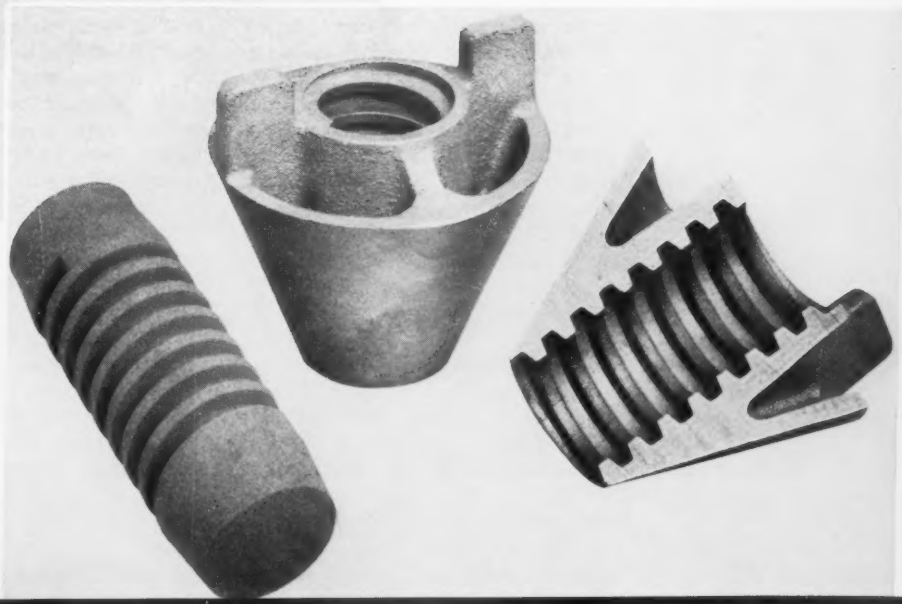


Fig. 9—Cone casting originally designed as machined fabrication was very costly, but was made as a casting through use of a specially designed, four-part corebox

fications and are functioning properly. Good customer relations influence the success of future sales.

Sales Tools—Several aids can assist the sales engineer to do the best job. Photographs and samples of items being made in your plant may interest and influence the customer because of their similarity to items he is using. Direct mail advertising, if done on a regulated basis, reminds the potential casting user of your products. Handbooks dealing with the specifications of your material assist the engineering departments. Fig. 2 illustrates some of the selling tools our sales engineers have found of value.

A service which has helped us to sell many customers is a blueprint of a proposed part as a casting. If the part currently is a weldment, for instance, the smooth lines of the casting design have immediate eye appeal and enable us to incorporate the sections and details necessary to make the part properly. Under certain circumstances, a rough temporary pattern can be made and sample castings submitted to the customer, at nominal cost, for test purposes.

The foundry must work directly with its sales department to plan production to meet requested deliveries. Quality must be maintained, and cooperation between foundry and sales department is necessary in handling customer complaints. One of the best ways to sell our foundry and its product is to have the customer visit our plant. There he can see how we schedule his work (Fig. 3) and how it is made. Most importantly, he can meet the people who are responsible for producing his castings.

Creating New Business—The greatest potential for new business for the foundry industry lies in aggressive efforts to develop new casting uses in new products and in conversions from other methods of manufacturing. In many instances, development or conversion work on an item may take months to complete. Once the sales engineer has established the customer's interest in a casting, he must not be discouraged by the endless red tape of checking competitive costs and testing samples when considerable tonnage to the foundry is at stake.

Methods departments usually can expedite an early decision, but a thorough study must be made by the customer on the basis of preliminary estimates originated by a casting drawing proposal. Experimental work in field testing may be required—usually with samples made from temporary pattern equipment.

In Fig. 4, the conversion from a welded fabrication, left, to a malleable casting assembly was in the experimental stage for more than two years before it was released by the engineering department for production in our foundry. As originally designed, the main portion had to be blanked and formed. The crosstie was welded on the bottom and this subassembly was coined to insure line-up between the two hooks. The small piece of tubing had to be jig welded very accurately because of center-line tolerance with the hooks. A screw machine part welded across the top served as a spring retainer, and a bolt hole had to be tapped.

The casting, however, requires only tapping. It is necessary to use a shell core, third from left, to meet the needs for the complete assembly with reference to the hooks and the pivot of the cap. For the spring retaining feature, small ram-up cores are set, and knurled pins are driven into the casting.

The conversion was made possible through the concerted efforts of our sales engineer who co-ordinated the design requirements of the part with the most practical aspects of the foundry's capabilities. Naturally, cost reduction was the most influential factor in authorizing the necessary tooling and the pattern equipment. However, in the cast process the advantage of engineered appearance can neither be denied nor priced.

In Fig. 5, the casting shown, right, also is the result of customer-foundry co-operation. The original assembly, left, consisted of a main double spring, two screw machine bearings and two stamped straps which held the bolts to a proper distance and served as stops for the spring. This system worked successfully for a great number of units, but our foundry sales engineer felt that a casting could do a better job. The assembly was studied, and a drawing utilizing the advantages of a casting was presented to the customer.

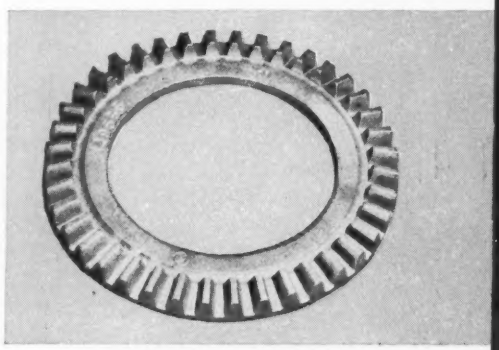


Fig. 10—New-type facing material was developed to obtain close tolerances for this ring-gear casting

The picture illustrates a few of the reasons for converting to a casting. A single casting replaces three pieces, and this one piece incorporates several features not possible with the former design. The strap could not center the spring on the bolt as does the small bead running around the wide end of the casting. This wide face, incidentally, covers the end of the spring and improves the appearance considerably. The other end of the casting is narrow and offset. Eliminating the need for a boss and permitting the hole to be green sanded. Thus the cast process provides metal only where it is needed and can do the most good. On the assembly line, the operator has to handle fewer pieces, speeding up his production. Unlike the strap, the

casting has no sharp edges which could cause injury. It also was so designed that it can be used universally for both right and lefthand when only single springs are used.

In other words, our sales engineer, with the cooperation of the customer, has improved the product and created new business for the foundry. Once the design and cost reduction advantages of castings are proved to a prospect or customer, additional tonnage will develop automatically on the drafting board.

The axle shown in Fig. 6 formerly was a forging with four 6 x 4 x ½-in. steel plates welded to it at a total cost, including machining, of approximately $23. Our foundry engineer suggested that it be produced as a one-piece casting of comparable strength. This conversion was made, and the castings were produced for $12.50 each.

New Methods Open the Door—The foundry industry is fortunate today in that many new tools for the production of quality castings have become available to it in recent years. Each of these materials and methods has its place in the industry and can help to sell castings. Individual foundries are adding to their facilities those new ones which best suit their needs. We have done just that at our company, and the following examples illustrate some of the business we have obtained through them which otherwise would have gone elsewhere or to other forms of fabrication.

D-Process Cores—Lower part in Fig. 7 originally was designed as a pearlitic malleable casting. Although a hole was cored to ½-in., it required drilling to 41/64-in. for a ⅝-in. pin. At the center line of the casting, a slot was milled to the depth of the hole. At the suggestion of our sales engi-

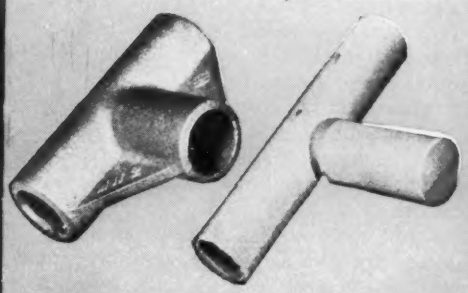


Fig. 11—Shell core held close tolerances, cut out machining and sold casting to customer

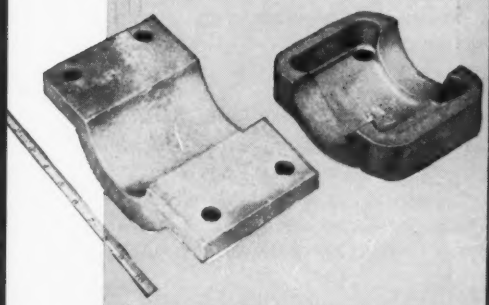


Fig. 12—Redesign created good will for foundry by cutting the weight nearly 30 per cent and customer's cost by 41 per cent

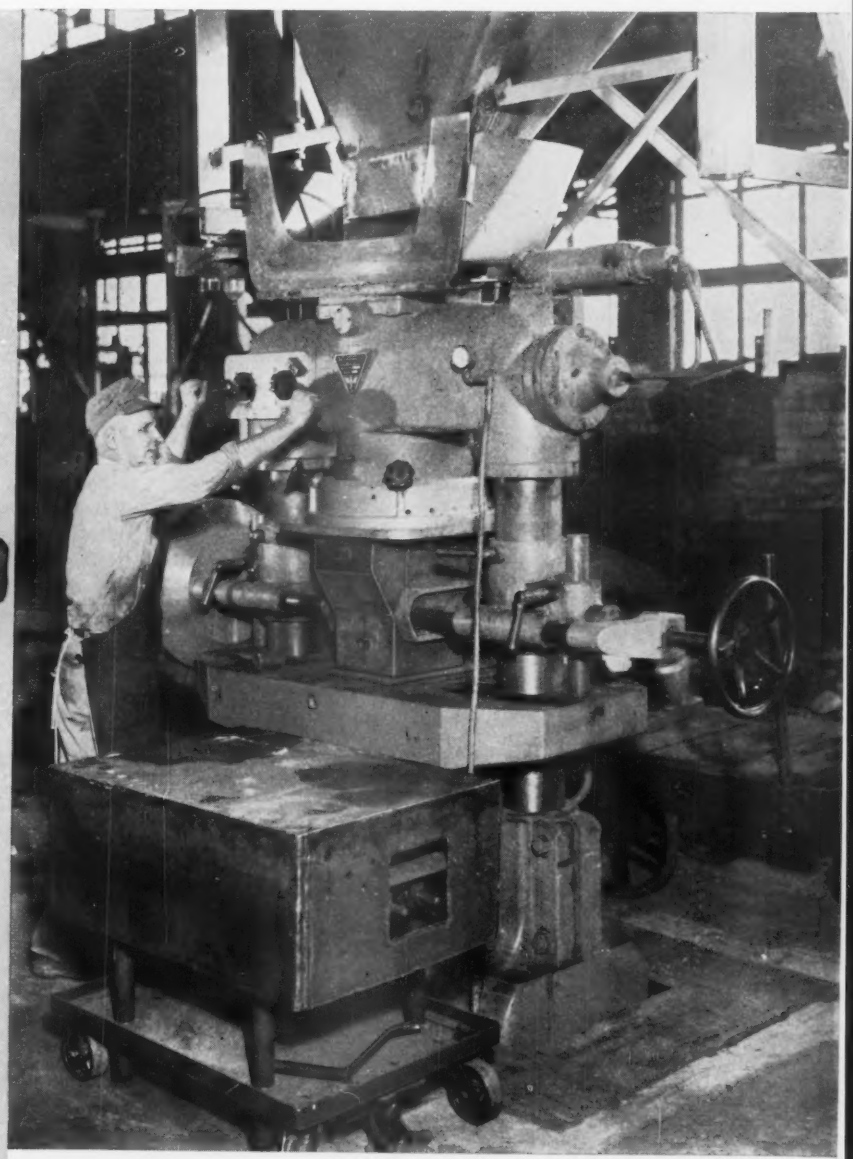


Fig. 13—CO_2 hardening of cores also helped to obtain new business. Coreshooter shown here is in process of shooting core

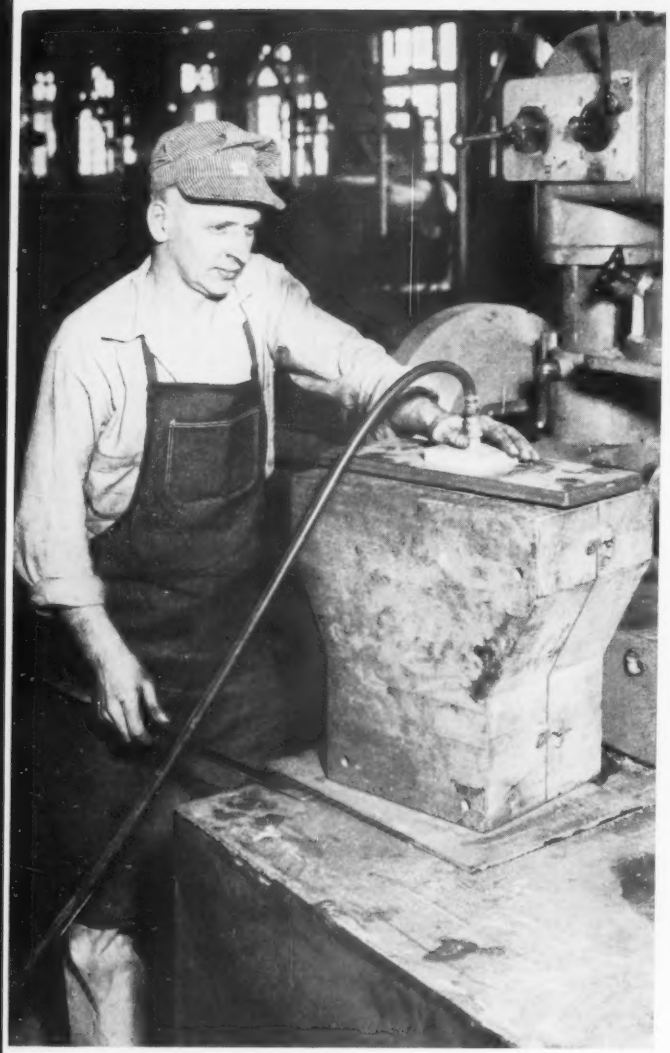


Fig. 14—In this view, operator is shown as he gasses the core which was being shot in Fig. 13. The gassing operation requires only 15 seconds

neer, D-process cores and special core dryers were authorized by the customer. By holding the diameter of 0.640 in. to a tolerance of plus 0.000, minus 0.015, all machining was eliminated, and the customer was able to use the parts as cast. Part at left, center row, is the redesign of the original.

Later, the parts in the top row were converted from welded fabrications to pearlitic malleable castings. Part at right, center row, is similar casting. All four new parts finally were made with cores from one corebox and one set of dryers, with further pattern and production economy. At center is the special core used to produce all four of these parts.

Fig. 8 is another example of present-day cost reduction through the use of D-process cores for close tolerance work. This item, used on a mechanical lift for an agricultural mower, first was considered as a conventional casting. It would have required machining of all five hole diameters and milling of the inside faces to eliminate casting draft for bearing surfaces. The use of D-process sand cores and appropriate dryers permitted coring in the manner shown and eliminated machining except for finishing the large diameter holes in line to a tolerance of 0.002 in. An estimate of the cost of the conventional casting and machining was made at $3.50 each. Actual production cost of the finished part, made with D-process cores as the foundry proposed, was established at $1.50 each.

Specially Designed Corebox—The cone casting in Fig. 9 originally was designed as a machined fabrication and proved very costly. The customer was familiar with our coring techniques, however, and requested the sales engineer to design the part as a casting which would not require machining. The casting presented several problems to the foundry. The internal threads had to be smooth, with no fin, and outside diameters had to be maintained. Past experience in other jobs requiring close tolerance coring had developed the foundry's ability to work with fine sands which are used to produce the threads. A specially designed, four-part corebox eliminated backdraft on the threads and controlled the parting. The casting was lightened out, as shown, to permit directional solidifica-

Fig. 15 (below)—View of completed core which previously was shown during shooting and gassing

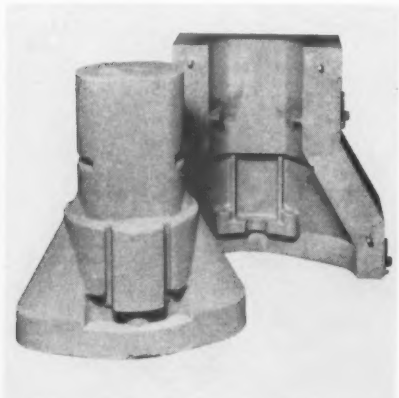


Fig. 16—This CO_2 hardened core sped up production and ended losses caused by sagging cores

tion. Proper molding and pouring have kept the outside dimensions to specification.

New Facing Material—Special cores do not always provide the answer for close tolerance work, however, as the ring gear in Fig. 10 illustrates. Setting the necessary cores and maintaining the proper relationship with the green sand surfaces could not be controlled. Instead, the development of new-type facing materials did this job to the complete satisfaction of the customer.

Shell Cores—The ability to hold close tolerances and thus eliminate machining sold the crosshead casting in Fig. 11 to the customer. This part formerly was made as a weldment, and it was necessary to ream the distorted holes. The one-piece casting has greater eye-appeal and uniform strength. Like the part in Fig. 4, without up-to-date foundry equipment, the job could not have been made as a casting. Promoting the use of shell core equipment for such applications can bring considerable tonnage into a foundry.

Redesign—Good will and customer confidence can be strengthened by the sales engineer through redesign of a part to achieve cost reduction. Fig. 12 illustrates a redesign which reduced the casting weight from 8.85 to 5.60 lb without loss of required strength. Consideration of foundry practice in the redesign permitted the use of green sand cored bolt holes rather than the more expensive practice of setting baked sand cores. This project reduced the cost to the customer by 41 per cent.

CO_2 Process—CO_2 hardening of sand, which makes it possible to harden cores in seconds or minutes in the corebox, also has helped our foundry to obtain new business. We also are using a coreshooter, shown in Fig. 13 in the process of shooting a core. Fig. 14 illustrates this same core being gassed with CO_2 for about 15 seconds. Figure 15 is the completed core. The entire sequence takes less than 60 seconds.

The sales engineer should know all the possibilities and advantages of the CO_2 process so that he can assist his customers to utilize this process when it is the logical way to do the job. The combination of the CO_2 process and coreshooting may lower pattern costs by permitting use of wooden coreboxes because wear is not excessive. In addition, hardening in the box eliminates sagging and holds cores to close tolerances.

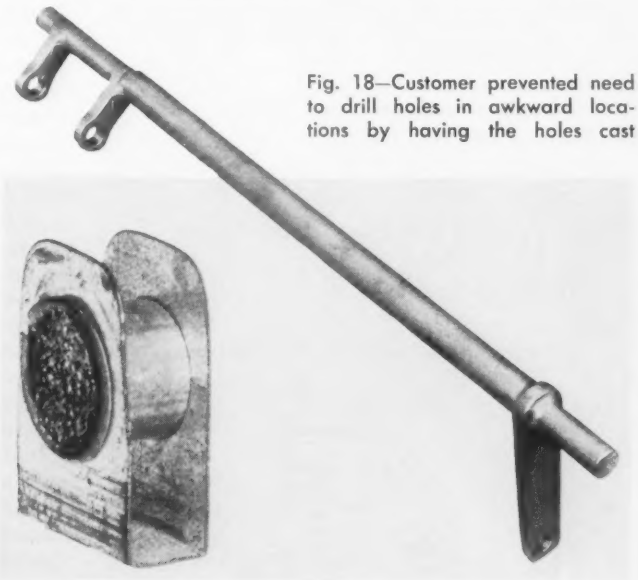
Fig. 16 shows a wheel hub which weighs about 130 lb and is 19 in. in diam. Until CO_2-hardened cores were used, production was extremely slow, and losses were high because sagging cores caused uneven wall sections. Our foundry sales engineer discussed this problem with the customer and recommended use of the foundry's CO_2 facilities. The new process doubled core production, and the wall sections of the casting were maintained to size, eliminating most of the expensive process of balancing. This casting uniformity was largely responsible for the design of similar hubs which provided considerable tonnage for the foundry.

Casting Design—For certain applications, our customers specify unannealed malleable with an average Brinell of 400. This hardness will not permit drilling and tapping. In the casting in Fig. 17, we used a threaded insert to take the zerk fitting for the bearing. In the same category are hinge tubes such as those used in the casting shown in Fig. 18. Here our customer eliminated drilling holes which were in awkward locations by having the holes cast. Improvement has been made by the manufacturer supplying such items, permitting closer control by the foundry. The use of inserts, hinge tubes, etc., is not always practical, but when warranted should be brought to the attention of the customer.

Promote the Industry—To complete a sales program, co-ordination with the industry is necessary. Your promotion and support of a trade organization to sell and better your product is important. The combined efforts of your industry can promote research, production techniques and sales programs that the individual foundry could not afford.

Fig. 17—Because this unannealed malleable casting could not be drilled or tapped, a threaded insert was used to take the zerk fitting for the bearing

Fig. 18—Customer prevented need to drill holes in awkward locations by having the holes cast



Cleaning Room Practice in

The Brass Foundry

Mr. St. John discusses removal of cores, gates and sprues; cleaning of casting surfaces; sorting; corrective procedures and inspection in this 22nd article of his series

By HARRY ST. JOHN
Foundry Consultant

THE cleaning room is an important part of the foundry establishment. Following separation of castings and sand at the shakeout, several operations are necessary before the castings are ready for the machine shop. These may be itemized as follows: 1. Removal of cores. 2. Detachment of castings from gates and sprues. 3. Cleaning casting surfaces, inside and out. 4. Sorting. 5. Snag grinding and corrective work. 6. Inspection.

Some cores fall out at the shakeout and are carried away with the molding sand. These partially disintegrate and to that extent contaminate the molding sand with coarser grains. Surviving core butts are screened out of the molding sand along with fragments of metal and find their way to the salvage department. Most of the cores which still cling to the castings can be removed by hammering the runner while castings and gates are still attached, an operation which can best be performed by a mechanical vibrator. Any excess of molding sand sticking to the castings is shaken off at this time. Cores in very large castings require the use of an air-operated chisel.

Castings are detached from gates in a variety of ways. One method used by a few foundries is to break them off while they are still hot. This applies particularly to the red alloys which are "hot short"—that is, they have little strength at high temperatures. Although this method appears to result in a labor saving, there are a number of objections to it, and it is not recommended for general use. Since the gates are hot and weak at the time of breaking, the castings unavoidably are hot and weak also. Some of them therefore will be spoiled by "hot cracking." The gates must be so designed that they will break at a desired point, far enough from the casting to avoid danger of breaking a piece out of the casting itself. This design commonly means an excessively large gate stub which will have to be ground off later. Furthermore, the prime function of the gate is to feed the casting, a function which should not be com-

Castings cleaned on blast table are moved to the cleaning room on a chain conveyor

promised for convenience in removing the gate.

A common method of cutting off castings is with a pair of knife blades mounted in a punch press. If the knives are properly designed and kept sharp, this operation is rapid and effective and is applicable when the gates are relatively small. Although it is not possible to employ a sweep guard or similar protective device, the operation is not so dangerous as it looks since the operator need not place his hands close to the knife blades.

If it happens that the castings are so arranged that a straight, continuous cut can be made, without frequent turning of the gate and runner assembly, an abrasive cutoff wheel can be used to advantage. It often is possible to cut so close to the casting that little or no subsequent grinding is necessary. The abrasive wheel also is suitable for gates too thick for the punch press knives and is by far the best method for use with tough metals such as manganese bronze and the high-nickel alloys. The so-called unbreakable wheels now available have taken most of the hazard out of this job. However, operators still feel more comfortable when equipped with face shields and padded body protectors.

For large castings which cannot be handled manually, cutting with a band saw is the usual method, and an air-driven chisel also is sometimes employed. Cutting with a torch, as often is done with steel, will not work for the nonferrous alloys because of the effect of heat on the structure of adjacent parts of the casting.

Blasting Preferred for Cleaning Surfaces

Surface cleaning of castings usually is accomplished by blasting, either with sand or with metal shot or grit. This operation may be done in a mill which slowly tumbles the castings to expose all surfaces or in a cabinet so constructed as to permit the operator to position castings by hand while he himself stands outside.

Large castings require a room in which the operator uses a flexible hose and nozzle. Another method is to spray the castings, either in a barrel or by hose, with a mixture of sand and water. In this case previous removal of cores often is unnecessary. In fact, it is not recommended since cores can supply the sand needed for blasting.

Color and texture of the casting surface can be controlled to a considerable extent by varying the character and timing of the blast. There is a marked difference, for example, between the finish produced by sand blasting and by steel blasting. Copper shot yields a still different effect.

Sand blasting is being largely superseded by blasting with metal shot or grit, usually steel or malleable iron. One reason for the change is that it eliminates any silicosis hazard. Mechanical force rather than air pressure is most commonly employed in metal blasting mills, and air continues to find use in cabinets and blast rooms. The shape and size of metal particles should be selected by trial in order to get the desired casting finish. Small sharp particles of iron or steel are to be avoided since they will become embedded in the surface of the casting and later cause rust spots.

Copper shot is finding a limited but increasing use and gives a beautiful finish. Its one disadvantage is the high first cost of the metal, but this cost is largely offset by a longer useful life due to lack of brittleness. The high maintenance costs characteristic of blast mills also are reduced when copper shot is used in place of steel.

In an earlier article on metal preparation, the blasting of gates and sprues was mentioned. This is not essential, but does result in less furnace slagging and cleaner metal out of the furnace. In most cases it is hard to prove a saving.

At some place along the line, castings should be sorted before they reach the grinding wheels. A high rate of production at the wheels is dependent on the operator's ability to go through the same set of motions as he grinds one casting after another. The best time to sort is before the castings are cut from the gates since this step also will expedite the cutting operation. Additional sorting also will be necessary to set aside castings which still contain cores or core wires after blasting. This sorting can be done by the grinders, who will put aside such castings for individual treatment.

Grinding is done by abrasive wheels or coated abrasive belts equipped with hoods and air suction to remove the mixture of metals grindings and abrasive dust, which is collected and can be sold. The operator's eyes should be protected by goggles. To get maximum production, the peripheral speed of the wheel should be at the highest point consistent with safety. This means a comparatively low rotational speed when the wheel is new and of large diameter. As the wheel wears, it should be redressed and operated at a higher rotational speed in order to maintain a desirable peripheral speed.

A certain amount of skill, or at least care, is required in the grinding off of gates. Grinding must not be so deep or irregular as to damage the casting. Considerably more skill is needed in corrective grinding. This work involves the removal of surface lumps and fins or roughness on cored surfaces. Small wheels or pointed tools, flexibly mounted, are designed for this purpose. Assuming good foundry practice, only a small percentage of the castings made should need to be salvaged by corrective grinding.

Other corrective measures sometimes are employed, particularly for large castings. The appearance of the casting can be improved by peening small surface defects with a hammer or blunt tool. Welding, commonly used in the steel foundry, should not be attempted with nonferrous alloys since it usually damages the casting beyond repair.

Holes in flanges and other parts not designed to withstand fluid pressure can be "burned in." This operation consists of chipping out the defective spot to expose clean metal and packing molding sand around the opening, which then is filled with clean molten metal. The "fill" metal is chilled by

contact with the casting and thus is dense and strong, but adjacent parts of the casting will be weakened by the heat and should not be expected to stand pressure. Impregnation of porous metal by such compounds as sodium silicate, synthetic resins, or proprietary materials sometimes is practiced. Impregnation should not be employed without the knowledge and consent of the ultimate user.

On repetitive jobs, where a large number of identical castings are to be made each year, external grinding sometimes can be avoided by die trimming. By this method the casting is pushed through a die shaped to fit its contours so that gate ends, core caps and other projecting metal at the parting line are shaved off. This is a rapid and effective means to replace snag grinding, provided that the metal to be removed is not too thick. Since the operator must place the castings in the die one by one, his hands should be protected by a sweep guard or similar device.

Grinding or die trimming leaves a bright surface which differs in color and texture from the rest of the casting. This variation is corrected and harmony restored by a brief blasting operation.

Defective castings should be thrown out whenever found so that unnecessary work will not be done upon them. However, grinders and others on incentive pay cannot be depended on to make a thorough inspection, and this job should not be expected of them.

Cut-off machine has adjustable table to help level castings for removing gates and risers

After the castings have been cleaned and ground, they should be sorted into three categories. If the work has been well done, most of them will be ready for delivery to the machine shop. A few will require corrective work and should be set aside for that purpose, and some will be rejected as unfit for use. At this point the inspectors, who should be conscientious but need not be expert, should be instructed to scrap all castings concerning which they are in doubt. Some of these may later be passed as acceptable.

Rejected castings should be accumulated and inspected by someone who is thoroughly familiar with foundry defects. It should be his job to diagnose the defects and to record them by weight and by casting item. These records then are passed on to those responsible for scrap control. No scrap control program can be fully effective without this information. Inspection of rough casting scrap will reveal some castings, possibly as much as 10 per cent, which can be used and should be delivered to the machine shop with or without additional corrective work.

There should be an equally thorough diagnosis of defective castings returned to the foundry after machining or testing. This scrap is the most costly of all; information regarding it is essential to scrap control.

Some Steps Beyond the Foundry's Functions

Two operations sometimes carried out in foundry cleaning rooms have not been described because, in the writer's opinion, they are not properly foundry functions. One of these is acid dipping, which is variously expected to clean and color the castings or to make them more machinable. More effective and less messy methods for cleaning already have been described, and the belief in improvement in machinability as a result of acid dipping is probably mistaken. Almost any desired color on brass or bronze can be obtained by dipping in acid or other chemicals, but this operation is hardly a part of the foundry's job. Color dipping is not practiced as much as it once was. When desired, it is more properly done in a plating or finishing department, where the removal of grease and finger marks usually is necessary in any case.

Pressure testing of rough castings before delivery to the machine shop should be a waste of time. If castings have been well made and properly inspected, few leakers will be found in unmachined castings. In exceptional cases, with an item which, because of faulty design, is expected to give trouble, testing may be worth-while. Testing with water at city pressure will reveal ordinary defects. Testing at 100 psi under water will show leaks due to porous structure in an otherwise sound casting.

The best layout for a cleaning room depends on the volume of work and the variety of castings involved. The important thing is to plan the movement of castings from foundry to front door with no back tracking and the shortest possible distance between one operation and the next. The backward flow should be limited to scrap castings and waste materials.

Effect of Section Thickness and Microstructure on

AZ 91 MAGNESIUM CASTINGS

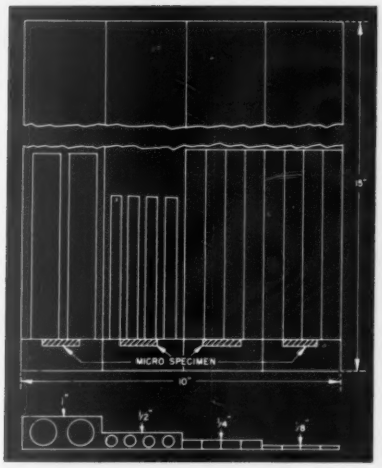


Fig. 1—Sketch of casting which yields maximum number of test specimens. It also shows the locations of tensile and microspecimens

Results of tests on effect of microstructure and section thickness are given. The investigation was undertaken to learn if properly designed AZ 91 alloy castings could be used in airframe construction applications

By JOHN K. DIETZ
Structures Materials Engineer
Chance Vought Aircraft Inc.

AS AN extensive user of AZ91 magnesium alloy sand castings, Chance Vought Aircraft Inc. long has felt that with proper design considerations, such castings can be used successfully in airframe construction applications with important cost and weight savings.

Use of the term "proper design considerations" is important. Unless the designer and the structures engineer are aware of the effects of section thicknesses on mechanical properties, the castings will not be designed properly. If a casting is predominantly a thin section—that is, ⅛ to ¼-in.—a greatly overdesigned part would result. Conversely, if the casting is predominantly a heavy section—that is, ¾ to 1½ in.—an underdesigned part would result. These statements are based on the assumption that the design values from federal specifications QQ-M-56 are used.

It often has been stated that if a structural casting exceeded the design strength by 200-300 per cent during a static test, this apparent overstrength

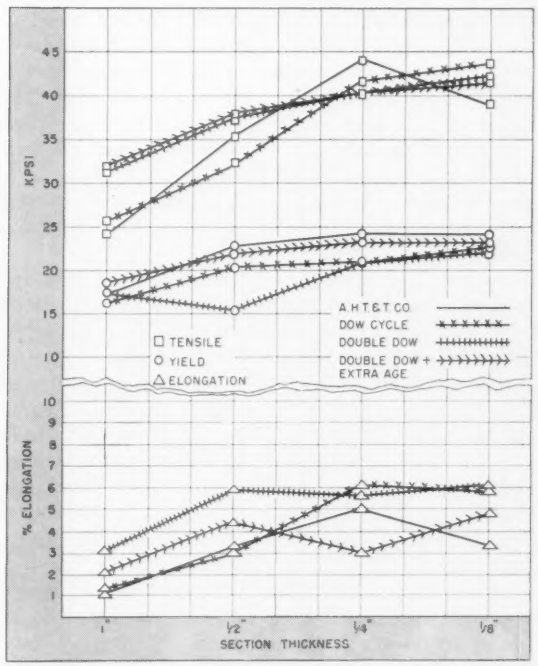


Fig. 2—Graphical presentation of the average tensile properties obtained by four different heat treatments on AZ 91 alloy step castings

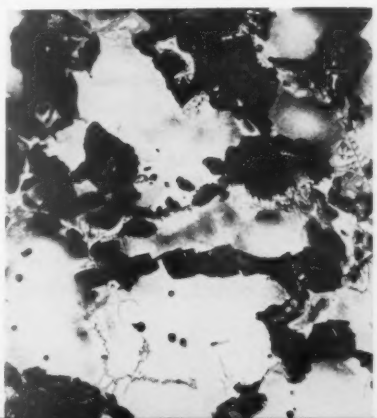
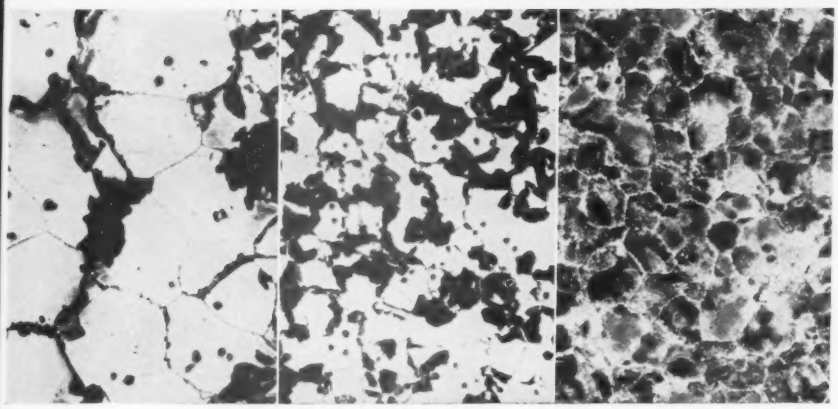


Fig. 3—Photomicrograph of 1-in. section shows microstructure yielded by Alloy Heat Treating & Testing Co. heat treat cycle



Microstructures produced by Dow cycle heat treatments are shown here. Fig. 4 (left)—Dow cycle, ½-in. section (casting No. 2, 1600-lb load). Fig. 5 (center)—Double Dow cycle on ⅛-in. section (casting No. 7). Fig. 6 (right)—Double Dow extra age on ¼-in. section (casting No. 9).

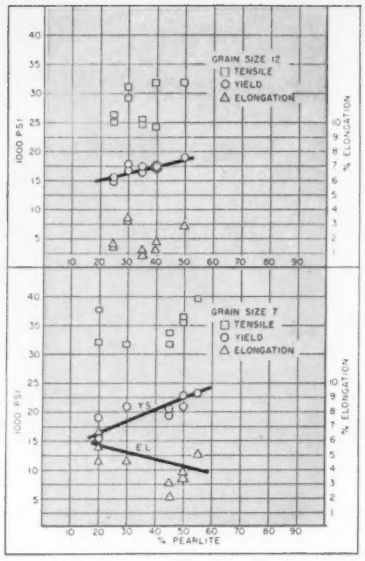


Fig. 7—Tensile properties of 1-in. section (top) and ½-in. section (bottom) as a function of the percentage of pearlitic precipitation

was due to a redistribution of stresses which could not be calculated. Although this assumption may be true in part, it is felt that the primary cause for this wide discrepancy is that the tensile strength values employed for design were lower than the strengths the material is capable of developing. A dangerous conclusion can be drawn from such a test—that is, to design to higher strength values based on the results thus obtained without regard to section thickness.

For example, a casting composed mainly of ⅛-in. sections designed to withstand a 150 per cent static load calculated on the basis of a tensile strength of 25,500 psi probably would fail at about 300 per cent. This would occur because ⅛-in. sections usually display a tensile strength of approximately 40,000 psi. Thus, if a second casting composed mainly of ¾ to 1-in. sections was designed on the basis of the results of the first static test, an assumption could be made that 25,500-psi tensile strength was much too conservative, and an understrength casting would result.

It was felt, after testing numerous tensile specimens from static test castings and attempting to correlate these results with those obtained by static test, that a program should be initiated to investigate the effect of section thickness, grain size, tensile properties and heat treatment.

To obtain a casting which would yield the maximum number of test specimens, the configuration shown in Fig. 1 was chosen. To eliminate the introduction of variables, the same pouring temperature was employed for all castings, and all metal used in the test came from the same heat. Chemical analysis revealed that the composition was in the middle of the range, as required by federal specification QQ-M-56 for AZ91 alloy.

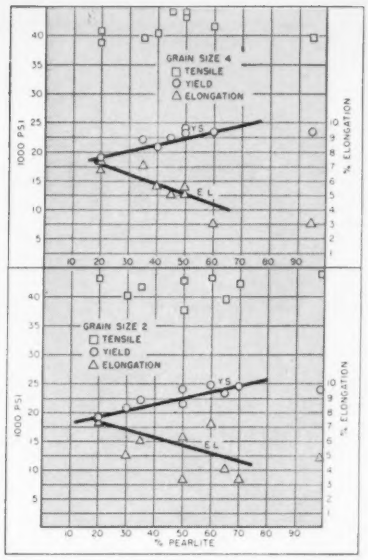
On receipt of the castings from the foundry, prior to heat treatment, complete radiographic examination was conducted. Some dispersed microshrinkage of a low magnitude was the only defect noted. Several heat treatment cycles were selected for trial, and two castings chosen at random were subjected to the various cycles. From this test, the following questions were hoped to be answered:

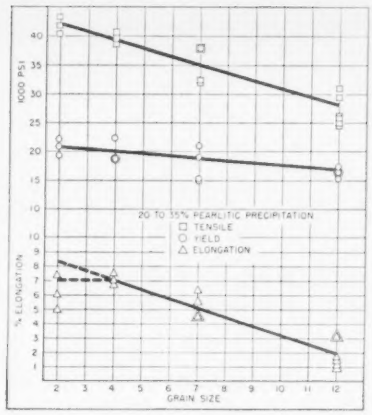
1. What effect does section thickness have on tensile properties?
2. What effect does grain size have on tensile properties?
3. What effect does the microstructure have on tensile properties—that is, pearlitic precipitate, free compound, etc.?
4. To what extent can tensile properties be varied by heat treatment?

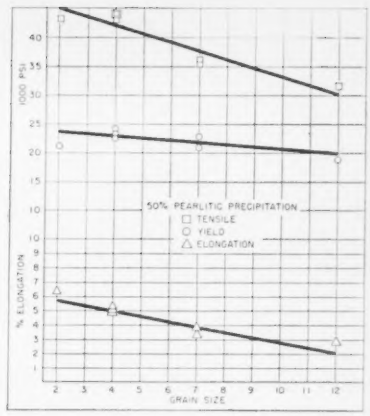
It was gratifying to find that not only were the above questions answered, but others as well. Findings on this test resulted in further investigations. The end result is that it now is possible to predict, with better than 90 per cent accuracy, not only the tensile properties, but the probable fatigue life, as well, by an examination of the microstructure of the casting. Before this is discussed further, however, it might be well to examine the initial phase of this investigation.

From Fig. 2 the following can be seen: 1. Graphic presentation of average tensile properties of four different heat treatments on AZ91 magnesium alloy step castings. 2. Change in relation of ultimate tensile strength, elongation, and yield strength. 3. The use of components requiring high elongation or high yield. 4a. Alloy Heat Treating and Test Co. cycle: 775° F for 20 hours; air blast quench; age at 320° F for 16 hours. 4b. Dow cycle: 780° F for 6 hours; furnace cool to 670° F for 2 hours; raise to 780° F for 10 hours; air blast; age at 335° F for 16 hours.

Let us consider some of the photomicrographs taken from the various test specimens. Table I, based on Figs. 3 through 6, shows grain size, per







Tensile properties as a function of the grain size are shown above. Fig. 9 (left)—With 20 to 35 per cent of pearlitic precipitation. Fig. 10 (right)—With constant 50 per cent pearlitic precipitation

Fig. 8—Tensile properties of ¼-in. section (top) and ⅛-in. section (bottom) as function of the percentage of pearlitic precipitation

cent of pearlitic precipitation, yield strength, ultimate strength, per cent elongation and type of heat treating cycle employed.

Having seen the various microstructures, let us examine and analyze these results. Figs. 7 through 10 present the following: Fig. 7: Tensile properties of 1-in. (top) and ½-in. (bottom) sections as a function of the percentage of precipitation. Fig. 8: Tensile properties of ¼-in. (top) and ⅛-in. (bottom) sections as a function of the percentage of precipitation. Fig. 9: Tensile properties as a function of the grain size with low percentage of pearlitic precipitation (20-35 per cent). Fig. 10: Tensile properties as a function of the grain size with a constant 50 per cent pearlitic precipitation.

As can be seen from the graphic presentations, a relatively accurate estimate could be made of the tensile properties of a casting by estimation of the microstructure. Since the graphs presented heretofore were based on laboratory data, it was felt that these results should be checked on production castings from various sources.

For a period of time, all tensile specimens taken from production castings during routine testing also were given a microexamination. Results of this survey disclosed that tensile strength, yield strength and elongation could be determined by this method with an accuracy of better than 90 per cent.

TABLE I—Properties of Various Specimens

Fig. No.	Grain Size	% Pearlitic Precipitation	Yld Str 1000s Psi	Ult Str 1000s Psi	% Elong	Type of Cycle
3	12	40	17.2	24.2	1.1	AHTT
4	7	30	20.9	31.7	4.5	Dow
5	2	35	22.1	41.9	6.0	Dbl. Dow
6	4	90	23.4	39.6	3.0	DD + EA

Shortly after the foregoing program had been completed, a casting was submitted to the laboratory for evaluation after it had failed to meet fatigue requirements during a repeated load test. A complete metallurgical examination was made including a microstudy to determine grain size and pearlitic precipitate percentage. Before the examination of the first casting had been completed, several additional castings were submitted for the same evaluation. All had failed to meet fatigue requirements.

An examination of these castings revealed a grain size of 8 and a pearlitic precipitate of 50 per cent. It was felt that the primary causes of premature failure were excessive grain size and pearlitic precipitate; however, this theory had to be proved. To do this, three additional castings were procured. To reduce the grain size, chills were employed in the area of high stress. The heat treating cycle chosen was to produce approximately a 30 per cent pearlitic precipitate. An examination revealed a grain size of 4 with a 35 per cent pearlitic precipitate.

Fatigue testing of these castings revealed that they had a life approximately 70 times that of the original castings. The actual life of the first castings varied between 70 and 110 cycles, and the fatigue life of the fine-grained castings from 6900 to 6999 cycles.

As a result of these findings, requirements now have been established on the blueprint which specify a maximum grain size and pearlitic precipitate percentage.

In conclusion, it is felt that further work needs to be done not only on the AZ91 alloy, but on others as well. This work should result in specifications that reflect the attainable properties in various sections, rather than the existing specifications, which have requirements that cannot be met in all cases. It is believed that this approach will result in castings which more nearly utilize the full available potential of the material.

Dehumidification of the Cupola Blast

This article, covering benefits to be achieved by removing moisture from cupola blast air, was given at the Malleable Founders' Society Technical and Operating Conference held in Cleveland Feb. 7 and 8

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THE SUBJECT of moisture removal from the cupola blast has been controversial among foundry operators for many years. Justification for original installation cost and subsequent operating cost has appeared nebulous to many with respect to material savings and scrap reduction. Much has been written about the effect of hydrogen on base metal used to produce malleable castings and about the effect of moisture on operation of a cupola. Much of this information remains to be verified to convince the melting department operator and foundry management that control of moisture in the cupola blast is advantageous.

Equipment Is Described—Texas Foundries Inc. has dehumidified the cupola blast in its malleable foundry for many years. Three years ago when the original equipment was replaced, considerable thought was given to the type of dehumidifier that would give best control and best service. As a result, it was decided to install an 80-ton capacity unit.

The principle of operation is simple. The filtered blast is cooled to 41°F, at which temperature a cubic foot of air is capable at saturation of holding only 3 grains of moisture.

As seen in Table I, the dehumidifier is comprised of two compressor units—one 50-ton unit and one 30-ton unit. Either may be set as the primary unit as moisture level in the outside air demands, or both can operate in tandem. In winter, when humidity generally is lower, the 30-ton compressor is operated as the primary unit, which requires the occasional kick-on of the 50-ton compressor. With higher moisture, the 50-ton unit serves as the primary, with intermittent use of the 30-ton unit. At the high moisture contents generally encountered in the summer months, both units operate. Selection of the primary unit to be used is left to the cupola operator and depends on weather conditions. Inasmuch as moisture in the air at this plant does not fall below 3 grains per cubic foot more often than ten days a year, no provision was made to add moisture to the blast.

The dehumidifier is capable of refrigerating 8150 cfm of air at 11 grains per cubic foot moisture down to the control limits of 2¾ to 3¼ grains per cubic foot. Actual automatic control by the unit is based on 41°F wet-bulb measurement allowing 2°F wet-bulb variance. At 5400 cfm with saturated air, the unit will remove 45.2 gal of water per hour. The average for the year is 17.4 gal per hour.

Figs. 1 and 2 show two views of the dehumidifier during construction. Before completion, the walls of the refrigerating compartments were insulated with cork. The walls themselves are of brick. The building is cooled by an exhaust fan adjacent to the compressors. Incoming air opposite the exhaust station is dry filtered.

Air Is Washed—Incoming air for the cupola passes through a capillary washer which removes

TABLE I—Dehumidifying Unit for Cupola Blast

Capacity: 80 Tons
Compressors: One—50 Tons, one—30 Tons
(Either may be set as primary unit)
Control Limits: 41°F wet bulb with ± 2°F variance
3 grains/cu ft with ± ¼ grain/cu ft variance
Maximum Blast Capacity: 8150 cfm @ 11 grains/cu ft
Moisture Removal: 17.4 gal/hr @ 3 grains/cu ft
(@ 5400 cfm) 45.2 gal/hr @ 8 grains/cu ft
Cost of Installation: $24,460.45 (1954)
(Note: This unit does not add moisture to blast below 3 grains/cu. ft.)

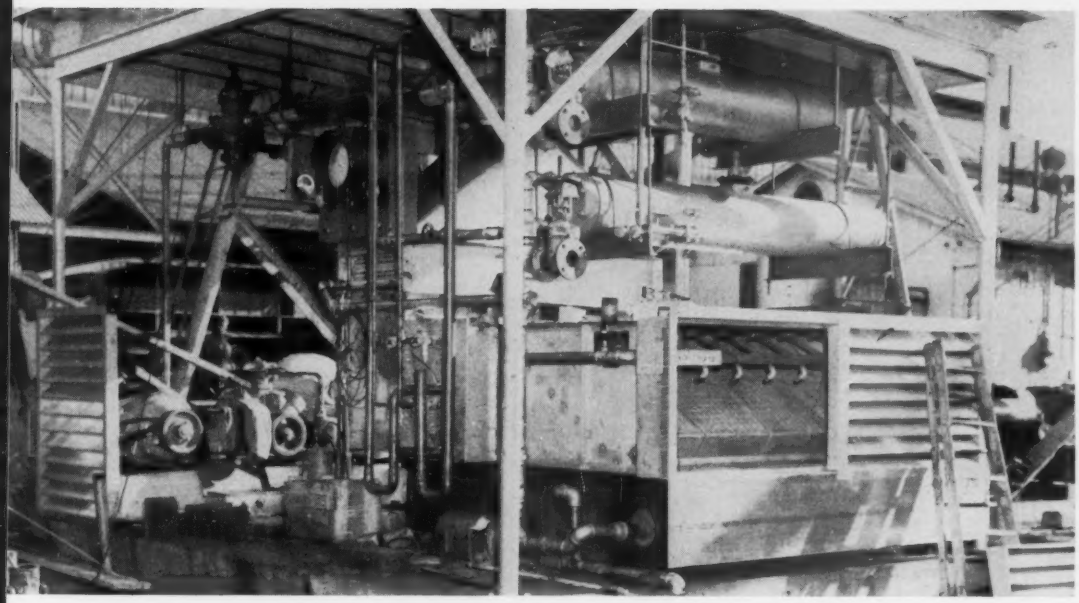

Fig. 1—Blast intake side of dehumidifier. Photo taken before completion of building

dust (see Fig. 1). The spray water helps to saturate the air with moisture if incoming air is cool and low in moisture and, more importantly, removes moisture and cools the air if it is hot and humid. In this respect, the sprays stabilize the temperature and moisture of incoming air to some extent. The air then passes through the cooling coils, up through reheating coils and from there through the blast pipe to the cupola blower. Air entering at 70°F average is cooled to 41°F and is reheated slightly in the reheat coils. By the time the dry air enters the cupola, friction has increased its temperature to about 70°F.

Water from the capillary washer spray falls into a tank at the base of the unit, is pumped through the reheating coils, where it is cooled, and brought back through the spray to the tank, thus using a simple principle of heat exchange. Condensed moisture from the air also drips into the tank, creating a constant overflow. Consequently there is little or no need for makeup water. Tank water remains at approximately 60°F during operation.

Starting with the condensers, directly above the washer, the liquid refrigerant flows to expansion valves at the head of the cooling coils and expands to gas, thus cooling the coils. It passes as gas from there to compressors, shown in the background of Fig. 1, then goes back to the condensers to form a liquid.

The condensers are supplied with recirculated water at 85°F from the forced draft cooling tower shown in the background of Fig. 2. The 50-ton compressor serves the large condenser directly above the washer, and the smaller condenser on top is served by the 30-ton compressor. Control indicators may be seen in Fig. 1, mounted on the unit directly above the heating coils.

Tangible Savings—All the benefits from dehumidification cannot be reduced directly to a dollar value. Since humid air requires more coke than dry air to maintain a constant bed height during cupola operation, the outstanding tangible saving is in coke usage. Direct saving of coke, discounting cost of operating the unit, can be computed on the basis of data in Tables II through VI.

Data shown in Table II are based on operating experience at Texas Foundries Inc. Power consumption figures shown in Table III are close estimates based on equipment output. Maintenance of the unit has been at a minimum. It consists mainly of weekly inspection of filters and includes repair of two leaks in the refrigerant system which occurred during the past three years. Replacement of refrigerant accounts for the high cost figures. Costs of operation are broken down to per-day, per-hour, and per-ton-of-metal figures for ease of comparison with different operations.

The normal coke split of 240 lb per 2000-lb

TABLE II—Data for Figuring Operating Cost of Dehumidifier

Power Demand	= $62.50 per month
Power Rate	= $ 0.0056/kwh
Maintenance Labor	= $ 2.00/hr
Refrigerant	= $125.00/drum

Tonnage per day = 100 tons
Operating days per month = 21 days
Operating days per year = 250 days
Operating hours per day = 8 hr
Yearly average intake air temperature = 70°F
Yearly average grains moisture per cubic foot of air = 6 grains
Yearly variance of moisture in air = 2 to 10 grains/cu ft
Yearly average moisture removed per cubic foot of air = 3 grains
Yearly average cupola blast to melt 100 tons/day = 5400 cfm

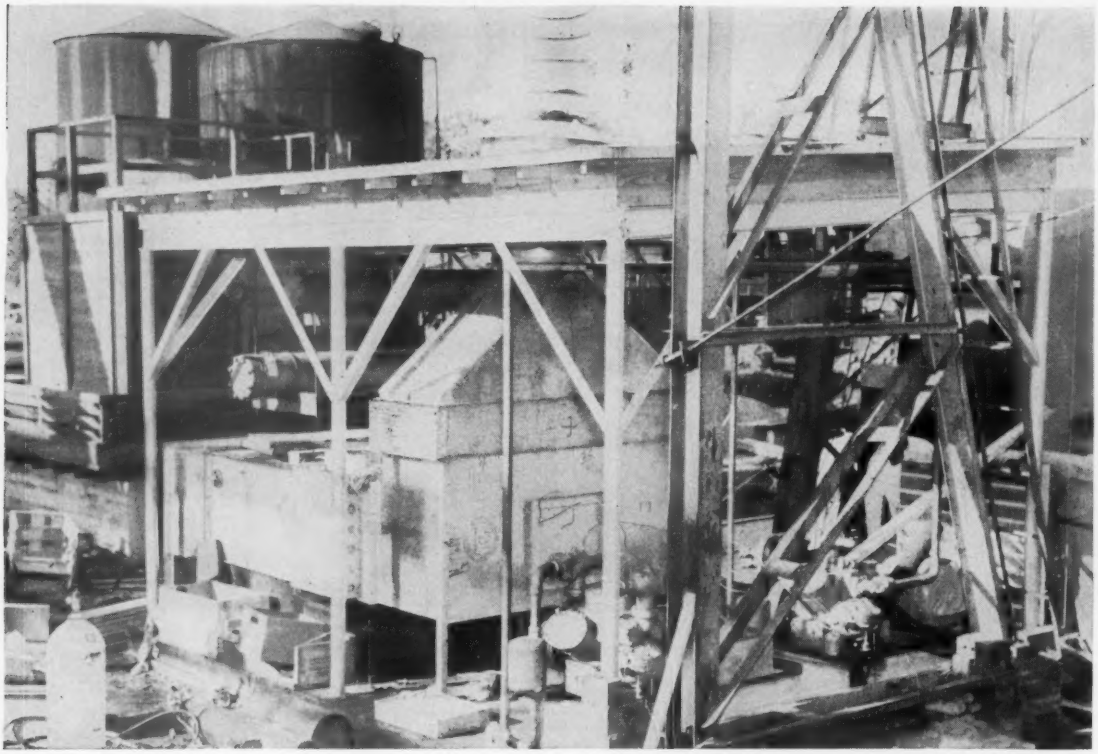

Fig. 2—Outlet side of dehumidifier, showing compressors; cooling tower in background

charge shown in Table IV is based on an operation using 35-45 per cent steel rail and 10-15 per cent pig iron in the charge. Melting is done in a skip-hoist-charged, 52-in. ID cupola at a 12½-ton per hour melting rate with an average 22 per cent silicon loss. It was the practice, prior to installation of the new dehumidifier, when moisture was not removed from the blast, to take periodic psychrometric readings of moisture in the air and adjust the coke split according to grains of moisture per cubic foot over 3 grains per cubic foot.

Experience indicated that 10 lb of coke had to be added to the split for every additional grain per cubic foot. This adjustment may seem high according to theoretical amounts required, but as a practical matter the 10-lb increase was necessary to offset increased oxidation. This has been the author's experience in two different plants over the past 13 years and checks out with the experience of other operators in different plants.

Cost of coke in Table IV includes freight and unloading charges.

As shown in Table V, the coke saving amounts to 30 lb per 2000-lb charge or 3000 lb per 100-ton day.

Applying the coke saving figures per day and discounting power and maintenance costs, a net saving per day of $45.55 is accomplished as shown in Table VI. This amounts to $11,387.50 per year and, based on installation cost, the dehumidifier would pay for itself in 2.17 years on coke alone. The amortization does not include depreciation or interest on investment since these allowances vary according to plant accounting methods.

Intangible Savings—Many intangible advantages are of direct importance to the operator who must perform within the close tolerances established by metallurgical control requirement. Any tool that can be provided to facilitate staying consistently within control limits is sure to pay dividends production-wise, quality-wise, and cost-wise.

Use of a dehumidifier eliminates periodic moisture determination with a psychrometer and makes possible less coke adjustment in the cupola. This advantage means more than generally is recognized. Coke adjustments due to increased moisture, although beneficial and necessary, always lag behind the actual change in atmospheric moisture. Before the increased coke split hits the bed there is always the hazard of pouring oxidized metal detrimental to the quality of malleable iron. Every

TABLE III—Cost of Dehumidifying Cupola Blast

	Per Day	Per Hour	Per Ton of Metal
Demand Cost @ $62.50/Mo.	— $2.98	$0.37	$0.0298
Power Cost @ 50KW/hr.	— 2.24	0.28	0.0224
Maintenance Cost @ 1.5 hrs./wk.	— 0.60	0.075	0.0060
Refrigerant Cost @ $150.00/3 yr	— 0.20	0.025	0.0020
Total Cost	$6.02	$0.75	$0.0602

TABLE IV—Data for Figuring Coke Saving

Normal coke split per 2000 lb. charge @ 3 grains moisture/cu ft	— 240 lb
Extra coke required for each grain/cu ft over 3 grains/cu ft	— 10 lb
Cost of coke (1956)	— $1.719 cwt.

TABLE V—Coke Saving

	Per Day	Per Hour	Per Ton of Metal
Coke Saving @ 3 grains/cu ft removed	$51.57	$6.45	$0.516

TABLE VI—Net Coke Saving Due to Dehumidifying

	Per Day	Per Hour	Per Ton of Metal
Coke Saving	$51.57	$6.45	$0.516
Cost of Operation	—$6.02	—.75	—.060
Net Saving	$45.55	$5.70	$0.456

$24,460.45 installation cost

$11,387.50 net saving/year = 2.17 years amortization

(Note: Above amortization does not include depreciation or interest on investment.)

operator knows the difficulty in getting back on the beam once the bed has been lost. The same is true with a drop in atmospheric moisture. Although it is less detrimental to quality, buildup of the bed with unneeded coke reduces melting rate, lowers silicon loss and increases sulphur and carbon. Dehumidification of the blast therefore reduces error resulting from human judgment.

Ability to operate a cupola at a nearly constant coke bed height is a prime requisite in controlling oxidation in the cupola, and dehumidification helps to hold the bed height. At Texas Foundries, per cent of silicon loss plays a large part in quality production. Without the benefit of moisture control, control of silicon has proved difficult. A controlled operation necessitates less analysis adjustment both in the cupola and the air furnace. The ability to control cupola metal carbon at a given level is extremely important in maintaining the carbon reduction rate which also offsets the effect of hydrogen pickup in the air furnace.

Less fluctuation of melting rate is important to the operator. Coke adjustment to offset increased moisture in the blast reduces the melting rate up to 2 tons per hour in some cases, particularly when metal charges are high in steel plate scrap, with large surface areas exposed to oxidation. It is improbable that we could keep up with foundry production and still maintain quality metal control without the advantage of blast dehumidification.

Experience has shown that high moisture in the blast caused considerable trouble in freezing over the tuyeres. This freezing meant costly delay in knocking the tuyeres out and created uneven and excessive burnout of the cupola lining.

Another intangible saving for the operator has been the more uniform production of hotter cupola metal. This uniformity has resulted in maintaining the same fluidity of the air furnace metal at less fuel consumption and refractory wear in the air furnace.

Metallurgically, dehumidification of the blast lends itself to better control of oxidation in the cupola and to minimum hydrogen pickup, both of which are beneficial to quality requirement.

The ability to control oxidation in the cupola within established safe limits for a given plant operation requires less use of deoxidizers in the cupola, the air furnace and the ladles. The cupola can be operated at less stack loss and at less silicon loss—the latter amounting to about 0.05 per cent less silicon in the charge in this plant. This increased yield and saving of material alone can amount to several thousand dollars per year at the tonnages set forth earlier in this article.

Minimum hydrogen pickup by the metal in the cupola has proved that less shrinkage[1] and less pinhole porosity occur in the castings.[2] Hydrogen creates large flake graphite and low nodule count, both of which lower the physical properties of malleable iron.[3] Hydrogen increases the decarburization rate, with resultantly increased pearlitic rims, which lower elongation of the metal. Excess hydrogen in the metal demands closer control of annealing cycles and increased annealing times.[2]

Much controversy exists about the effects of hydrogen on hot cracks in malleable iron. Experimental work has proved that a hydrogen atmosphere over a furnace bath increases hot tearing resistance.[4] Work done in the author's plant led to the conclusion that hydrogen itself is not a factor in hot tearing.[5]

In the author's opinion, the hot cracking tendency of malleable iron is decreased through use of cupola blast dehumidification not because of decreased hydrogen in the metal, but as a result of controlled oxidation. Experience has proved that high oxidation in the cupola, as measured by high FeO in the slag, black color of the slag, and high silicon loss, increases hot cracking tendencies.

Conclusion—Dehumidification of the cupola blast offers a real advantage to the metallurgist and to the operator both in the tangible saving of coke and many intangible savings, like those made possible by minimum hydrogen pickup and controlled oxidation in the cupola.

Appraisal of such intangible savings as in deoxidizers, silicon, refractories, stack loss and reduced scrap add up to a sizeable figure. Amortization of the investment, including interest, replacement cost, maintenance and the tangible and intangible items mentioned above was estimated at 1.62 yr in the author's plant, as compared to the 2.17-yr amortization based on coke saving and maintenance alone.

The 80-ton capacity dehumidifier was produced by Carrier Corp., Syracuse, N. Y.

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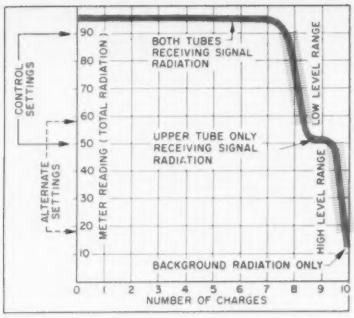
Radioactive Gage Aids Cupola Stock-Line Control



By H. A. TUTTLE and G. E. NOAKES
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and

T. ROY THOMAS
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Ferndale, Mich.

STOCK-LINE control on cupolas is being recognized as a critical factor in cupola operation. With closed-top cupolas now in increasing use, remote-level indication is desirable. Maximum furnace utilization, maintenance of uniform composition and prevention of operational failure due to too high or too low a level of operation are the dividends of adequate level control.

The elements of adequate stock-line control are these: 1. The indication of high and low-level limits. 2. Level conditions displayed on a continuous basis. 3. Instrumental control of furnace operation based on level. 4. Instrumental reliability.

Until early 1956, the Dearborn Iron Foundry of Ford Motor Co. used pneumatically operated rods to gage stock level. The rod was plunged horizontally into the cupola at the operator's discretion. When it encountered stock, the rod could not move its full travel distance and thus indicated stock height. This gaging method does not possess the necessary elements of stock-line control outlined above.

The level is sensed only when the operator checks the level. Such a contingent system thus is basically limited, and objective instrumental control is not possible. Trouble is encountered when this type of gage fails in use: The rod may stick in the stock or be bent by falling stock. In the event of such a failure, it often is necessary to operate without stock-line indication until repairs can be made inside the furnace. A further difficulty encountered results from the small area and limited length of the rod. It may strike a void or on stationary stock, or it may create its own void.

Because research on radioactivity and its application has been extensive at Ford during the past eight years, it was natural that gamma ray level gaging should be investigated as a solution to this gaging problem. Much pioneering work of this type concerned gamma ray gaging of liquid metal height in batch-type cupolas. The principle was extended to stock-line indication on closed-top cupolas and water-cooled cupolas.

The gamma ray stock-line level indicator first was used on a cupola to determine when the stock had reached its maximum height. This device permitted use of the cupola at full capacity without danger of overloading, damaging the loading bucket or clogging the ducts. A gage was set up later to control the lower stock level on the cupola. The success of this type of gaging, and foundry enthusiasm, prompted Ford to have a commercial version engineered for cupola conditions. This work was done by Nucor Research Inc., Ferndale, Mich., a subsidiary of Nuclear Corp. of America Inc., and radioactive gages since have been installed on 14 cupolas in the Dearborn Iron Foundry.

The radioactive gage has all the elements required for good stock-line control in cupolas. The operating level of the cupola is known and displayed at all times. The level range determines the loading and hot blast controls continuously. The instrument is reliable since all instrumental components are outside the cupola and are unimpaired by heat, corrosion and falling stock inside the cupola.

To first prove out and develop a suitable gamma ray gaging technique, Ford ran initial experiments on a mock-up cupola section and later moved the gage to an operating cupola with a $\frac{5}{8}$-in. steel shell and 9 in. of silica refractory. At the gage height, this cupola is 108 in. in diam. A cobalt 60 source of 40 millicuries was placed on one side of the furnace at the high stock level, and a Geiger tube detector was placed diametrically opposite. The Geiger tube was connected to a ratemeter so that the radiation penetrating to the detector could be measured. When the level was low, the counting rate was rapid; but when the stock rose, blocking the radiation beam, the counting rate slowed down. A false reading due to a void is impossible since the beam gages the entire diameter of the cupola and the sensitive detector area is rather large.

A prototype gage was put in operation in September, 1954. This was first operated in conjunction with existing stock-line indicators and later on its own. The electronic circuit was connected so that when the upper level was reached, the loading bucket mechanism was made inoperative.

To effect maximum volume utilization and a uniform chemical composition, it became evident that a low-level control was necessary. When the stock drops below the optimum level, manganese and silicon content of the iron also drops. A prototype lower-level gage was installed and was coupled

Fig. 1—As shown, the source and Geiger tube A define upper charge level, and the source and Geiger tube B define the lower level

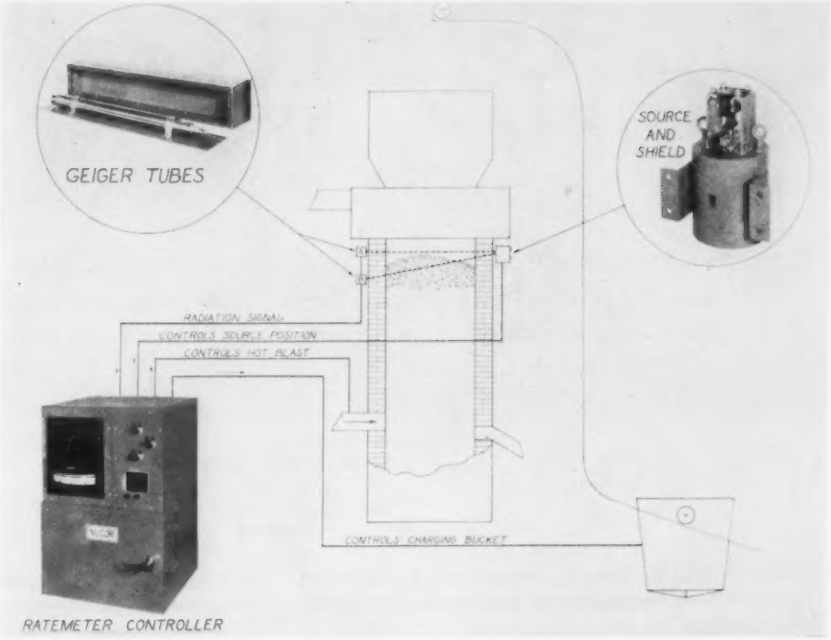

Fig. 2—Drawing shows an idealized plot of meter reading versus charges as the cupola is loaded. Actually, tapping is done before upper level is reached

with the air blast so that when the stock dropped below the desired level, the increased signal would trigger a three-minute time delay relay. If the cupola was not brought up above the low level in this time, the air blast was shut off. The efficacy of these two gages was established by an eight-month testing period, and it was decided then that all the Dearborn Iron Foundry cupolas would be equipped with dual level controls. The operating characteristics of the pilot gages were used to draw up specifications. It was decided that an engineering company, experienced in manufacture of control equipment, would build the gages to these specifications.

The commercialized version for dual level control was built by Nucor, and these gages began operation in May, 1956. At Ford, cupolas are operated in pairs, each cupola being used every other day. The control equipment cost was reduced by having one source and two detectors for each cupola, but only one electronic circuit and control for each cupola pair.

Fig. 1 illustrates the operating principle of the dual level gage. The radioactive source and upper Geiger tube A define the upper charge level A. The radioactive source and lower Geiger tube B define the lower level B.

There are three controlling states: 1. When the stock level is very low, as in initial charging, radioactive rays beam across the cupola and are picked up by both Geiger tubes and a fast counting rate is displayed. This is a nonoperating state for the cupola. 2. Stock height is such that the beam to the lower tube is cut off. In this condition, the counting rate drops to half of maximum. This is the operating state for the cupola. 3. When the stock height is high, the beam to the upper Geiger tube also is cut off, and the counting rate drops to the background rate. In this condition, the cupola continues to operate, but with no more loading.

A satisfactory method of indicating and controlling according to these conditions can be obtained by using a vane-type millivoltmeter controller-indicator with low-normal-high connections.

Fig. 2 illustrates an idealized plot of meter reading versus charges as the cupola is loaded. In practice, however, the cupola is tapped before the upper stock level is reached and is operated in the range between 7½ and 9½ charges.

In making such an installation using radioisotopes, safety standards set up by the Atomic Energy Commission must be met. The radioactive sources are housed in locked cabinets. The source is kept in a lead safe with an aperture on the cupola wall side. It normally is in a well below the aperture except when the gage is in operation. This prevents any radiation hazards to workmen while repairs are being made on the cupola. In operation, the source is moved by a remotely operated solenoid into the aperture window. In this position, the radiation field outside the cupola is well below safety limits. An independent circuit indicates the position of the source at all times.

The commercial gage should operate for a number of years without major servicing problems. Halogen-quenched Geiger tubes of infinite life are used. In these particular gages, cobalt 60 sources were used. Their radiation intensity drops to 50 per cent every five years. Useful life of the source is about three years, and replacement can be made at a minor expense.

In operation, the brickwork of the cupola between the radioactive source and the Geiger tube crumbles away, resulting in sudden increases in radiation transmitted. This increase usually is not enough to change the operating levels on two-point control, but it does tell the operator that the wall is thinning and may need repairing.

Which Core Process?

With four major coremaking processes from which to choose, foundrymen face the problem of which one to use and when and where to apply it. Here is a discussion of advantages and disadvantages of each process

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SINCE World War II, American foundrymen have been presented with at least three new processes for producing cores. These, added to the old familiar methods, present a new problem—when to use which process and where.

The four major processes in use today produce conventional, shell, gas-setting, and air-setting cores. To apply each intelligently requires some knowledge of each process and a comparison of strengths and weaknesses. It requires first, and foremost, a basic philosophy as to the function of the core itself.

Operator at left applies paste to conventional process core as other man sets wires in double-cavity box preparatory to blowing another core

A core may be defined as a tool to produce a dimensionally accurate cavity in a casting. As such, it serves its purpose once. It is not built to last through the ages. The best core is the cheapest one that does the job efficiently.

Generally speaking, each process shares four important processing stages upon which depend the technical and economic success of the core. These are measurement of materials, mixing of materials, fabrication, and setting of the binder. The effectiveness of each of these stages depends upon human effort and, consequently, is fraught with the possibility of human error. The amount and degree of human participation must, therefore, be weighed along with the materials and equipment required in each process. These factors plus the application at hand ultimately must dictate which process is best for which core in which foundry.

Thus the foundry industry finds itself in the position of the college professor who was accused of inattention to his duties for using the same list of final examination questions for 20 years. He answered, "It's all very simple. You see, the questions remain the same, but each year I change my ideas as to what are the correct answers."

Traditional requirements of cores are green strength for dimensional stability; baked strength to permit handling and setting; smoothness and accuracy to produce good finish and close tolerance; hot strength to resist metal penetration, washing, and cuts; and, ultimately, suitable collapsibility for cleaning.

The newer processes have eliminated green strength problems, but the others remain. Since each process has a place in the foundry of the future, it is well to define the processes, to list advantages and disadvantages, and to describe potential areas of greatest application for each.

Conventional Core Process—This process uses sand, cereal, water and oil or resin with other ad-

A group of resin-bonded sand cores illustrating typical examples of solid and hollow cores which are being produced by the shell process

ditives, such as clays, which may increase hot strength, or cellulose, which may improve collapsibility. Such cores are blown in machines or made on the bench and are baked in ovens.

Although accurate measurement and proper sequence of adding ingredients and proper mulling certainly have a tangible effect upon performance of conventional core mixes (see "Common Sense In Cores," FOUNDRY, July 1954), commercial cores can be produced with a variation in these factors. Though economies can be realized by proper control of these variables, tolerance in them must be classified as broad.

Baking is done in oil or gas-fired ovens with cycles normally in excess of 1½ hr. The use of fast-baking core oils or phenol or urea resins can shorten the baking cycle somewhat. Although the cost of fuel is relatively inexpensive, intricate jobs do require driers to maintain dimensional stability in the green state, and this need must be reckoned as an additional cost of producing the finished core.

In summary, major advantages and disadvantages of the conventional core process are:

Advantages—Traditional equipment can be used; equipment cost is low; much accumulated knowledge of process exists; control is not as critical as for other processes; a variety of sands, wet or dry, can be used; binder cost is low; the process is adaptable to a variety of jobs and conditions; hot, green, and dry strength properties are easily controlled and varied; fuel cost for baking is low.

Disadvantages—Cores bake slowly; driers are needed for intricate cores; cores must be handled in the green state, resulting in some scrap and less than perfect dimensions; comparatively large space is required for baking and for storing baked cores.

If phenol or urea resins are used in the conventional process, some peculiar advantages and disadvantages exist:

Advantages—Baking speed is increased; resin cores can be baked in dielectric ovens, cutting the baking cycle to 5 to 15 minutes.

Disadvantages—Some individuals are allergic to them; they possess an inherent inferior workability which must be compensated for by mix or release agents; they have shorter bench life; they present odor problems during mixing, fabricating and pouring; binders have limited storage life; cost of binders is higher.

The best major application for the conventional process would seem to be one in which flexibility of practice is prized and the low cost of materials and of baking is important. In other words, this process requires the least control, is reliable, and will produce good, dependable cores at a lower cost than any other process in most instances. Because of this it probably will continue to be the "conventional" process for a great number of core jobs in most foundries.

Shell Core Process—This process uses dry sand, free from clay, and 2.5 to 8 per cent phenolic resin binder. Resin and sand are mixed dry, then invested on a hot corebox or pattern for 30 to 45 seconds. During that time the resin melts and then resolidifies, binding the sand in a strong rigid shell. Excess sand-resin mixture is dumped out, and the hollow core or shell remains. This may be cured two or three minutes more in an oven before it is ready for use.

Resin-coated sand also is used. Sand is coated by mulling with a liquid resin or with dry resin and alcohol to put the resin into solution. Continued mulling with or without the addition of heated air to expedite evaporation of the liquids results ultimately in dry sand coated with a thin film of resin. Such sand is used similarly to the mixture of powdered resin and sand.

Accurate measurement of materials in sand-resin mixtures is critical, particularly in the case of coated sand. Precise amounts of alcohol and resin must be added, and mulling must be controlled carefully or potential strength of the mix be affected. Mullers must have special hoods, and normal precautions must be observed in handling volatile materials for coating sand. Mulling must

Sodium-silicate-bonded sand core is being hardened in short time by application of CO_2 through a circular tube attached to inner periphery of corebox. Completed cores are on floor in foreground

be controlled to avoid abrading resin from sand and must not be stopped so soon to have any residual plasticity left in the sand-resin mix.

Fabrication in the process is somewhat more complicated than in the conventional process since it requires a heated corebox and some method of investing sand on the corebox, whether it be a simple dump box or a more complicated blowing mechanism. Equipment is needed to maintain uniform heat throughout the corebox or pattern, and some provision must be made for the ultimately thorough setting of the core after it leaves the hot pattern.

Advantages—Shells set quickly; oven space requirements are small; cores are not handled in the green state; cores can be made for immediate use, eliminating handling; the process is adapted to mechanization; no driers are required; wash usually is not required because of finer sand normally used; shakeout is easy; curing the core in contact with pattern results in good dimensional accuracy; complex molds or cores such as air-cooled cylinders can be drawn easily; production per square foot of floor space is high.

Disadvantages—Binders are expensive; heated coreboxes are expensive; production per box is low because of the 30 to 45 seconds needed to cure the core; maintenance of uniform heat throughout box or pattern presents some problems.

Advantages of Resin-Coated Sand—Lower total resin content is required to produce equal strength; such sand can be blown without resin segregation; there is less dusting.

Disadvantages of Resin-Coated Sand—There are problems of solvent volatility and toxicity and potential fire hazard; extremely rigid mixing control is necessary; close grain-to-grain contact of coated sand produces cracking tendencies in long cores under thermal shock of hot metal.

The nature of the shell process adapts it best to long, repetitive jobs where the high investment in equipment and patterns is amortized. It also requires jobs in which high tolerance and finish are important and elimination of driers can help compensate for additional material costs. When the job lends itself to high mechanization, the process also offers advantages.

Air-Setting Core Process—In this process, 1 to 3 per cent binder plus oxidizing agents and catalysts are mixed with clean, dry sand. Depending on the amount of oxidizing agents and catalysts, plus the sand temperature and the temperature of the atmosphere, the mix offers a predetermined amount of time for core fabrication. The core is allowed to air-dry until it has developed enough strength to lift and handle without plates or driers. Then it is baked for a time equal to 50 to 75 per cent of the time required by normal oil binders to obtain maximum dry strength.

In this process measurement and mixing of core ingredients is of primary importance and must be controlled closely. The extreme flowability of the sand permits quick core fabrication, and ability of the cores to obtain strength upon standing at room temperature makes possible the elimination of most wires, rods, and arbors. Speed of fabrication is its major advantage.

Advantages—Fabrication of very large cores is faster; cores are dense with attendant better finish and resistance to metal penetration; cores are baked faster (no water is present) and some can be used without baking; cores have good collapsibility due to absence of green-bond-producing clays and bentonites; less labor required in coremaking;

less rodding, wiring, and arbors are required.

Disadvantages—Mixing cycle and measurement of ingredients are critical; bench life of mix is short; speed of set is affected by temperature of sand and atmosphere in which core or mold is produced; since the corebox is tied up during the setting process, use of the process is limited to large cores for which air-setting time is less than normal labor time to fabricate core or mold.

The process is well suited to making large cores or molds where labor saving can be affected. Normally it can be used for those jobs where the period of box tie-up would not present a problem and where the same labor could produce three or four times as much core tonnage in a given time.

Gas-Setting Process—In this process clean sand mixed with about 4 per cent by weight of a sodium-silicate-base binder is set by gassing with CO_2. The core may be used after gassing or may be baked if higher tensile strength is required.

The major difference between this and the conventional core process lies in the use of CO_2 to set the binder. Conventional measuring and mixing equipment and conventional ovens, if needed, are used. Measurement of materials is not particularly critical, and although mixing procedure has some effect on results, it too is not critical as compared to shell or air-setting processes.

Advantages—Reasonable core strengths are obtained without baking; since the core is gassed in the box, no driers are required for further baking; less core handling is required since cores can be made for immediate use and less storage space is required; since the cores are set in the box, better dimensional accuracy is obtained; because cores set fast, the process is good for short runs and emergencies.

Disadvantages—Gassed strength is low—usually less than 50 psi; the mix has poor flowability and workability and short bench life; cost of curing is higher than for the conventional process; baked cores sometimes have poor collapsibility; gassing is critical.

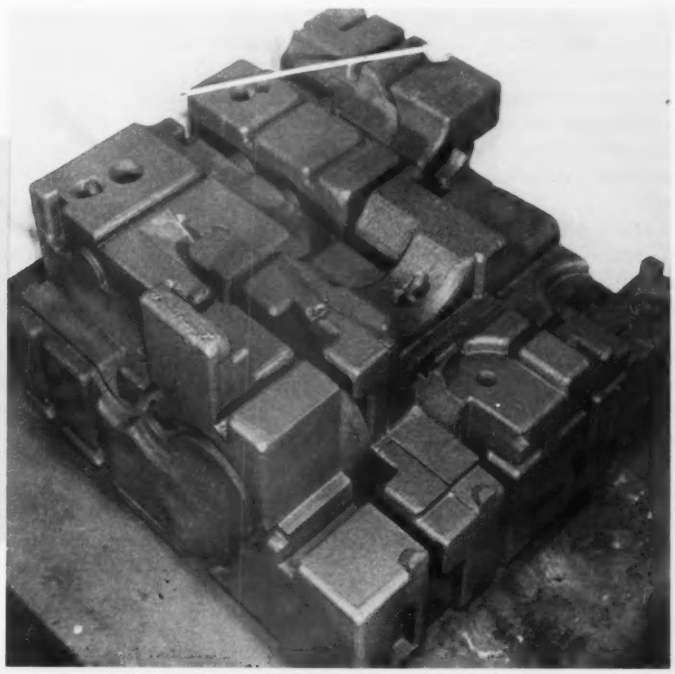
The process presents a paradox in that its major advantage, that of producing a core in a matter of seconds by gassing, is sometimes lost due to the inadequacy of gassed strength. If the core is baked, the old difficulty of producing adequate collapsibility with sodium silicate binders then rears its head.

The process does, however offer many suitable applications. The most logical, perhaps, lies in the range of medium-size cores where a variety of sizes and shapes combined with low production requirements do not permit a high degree of mechanization. It also has many molding applications which are beyond the scope of this article.

Any summary such as that presented in this article must be limited in accuracy due to its condensation and lack of consideration of problems involved in a specifc job.

The foundry industry is in the midst of great technological change, much of which is apparent in the coreroom. Rather than ignore this situation, it behooves progressive foundrymen to investigate new procedures to see if any of them fit their operation. A reasonable approach would seem to be that of investigating each process and trying to apply it where it will fit best. This possibility may lead to use of two or three processes in an individual shop.

Editors' Note: This article is based on a paper presented by Mr. Bishop at the 25th Annual Southeastern Regional Foundry Conference in Birmingham, Feb. 21-22.



Horizontal boring mill head core was made by air-setting process. It measures 31½ x 36 x 44 in. and weighs 2100 lb. Time needed for fabricating the core was 1¼ hr

HYMAN BORNSTEIN
Hoyt Lecturer

WARREN WHITNEY
Dinner Speaker

Congress and Castings Show Feature . . .

AFS Meeting

A LARGE attendance of foundrymen is expected for the 61st annual Castings Congress of the American Foundrymen's Society at Cincinnati, May 6-10. The society reports that the highest attendance for any convention without an exhibit of foundry equipment and supplies is indicated.

Helping to swell interest in the week's activities will be the first AFS Engineered Castings Show incorporating exhibits by foundries, pattern shops and producers of metals, alloys and laboratory equipment. Details of the show and list of exhibitors are presented on Pages 192-193.

This will be the fourth time that the society's annual meeting has been held in Cincinnati. Other national gatherings there were in 1898, 1909 and 1939.

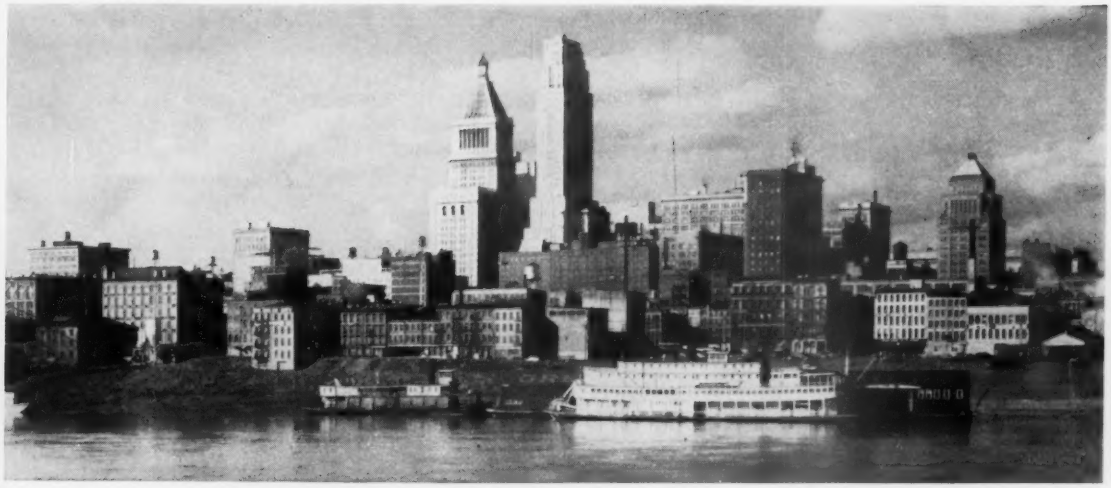
Dual registration headquarters will be maintained—at the Netherland-Hilton Hotel and Cincinnati Music Hall, where the Castings Show will be held. Technical sessions and most other events will be conducted at these two sites.

Technical Program—Subjects for technical discussion have been broadened this year to include certain topics of interest to design engineers and casting users. Among these papers will be one by H. F. Barr, chief engineer, Chevrolet Motor Div., General Motors Corp., Detroit, on "An Automotive Engineer Views the Foundry," the Charles Edgar Hoyt Memorial Lecture on "Progress in Iron Castings" by Hyman Bornstein, and "Castings from the User's Standpoint" by Thomas Logan, Caterpillar Tractor Co.

Management subjects on the program also are more numerous than usual. The newly formed Management Development Committee will have Wm. J. Grede, president, Grede Foundries Inc., Milwaukee, as principal speaker at its Wednesday luncheon session on the subject "Developing Foundry Management." Other topics of interest to management include statistical quality control, noise control, radiation hazards, manpower shortages, and legislation applying to safety, hygiene and air pollution.

Six papers have been received from abroad for presentation at the congress, including three official exchange papers. They include one from the Institute of British Foundrymen by Sir George Barnett of the Ministry of Labor on foundry health and safety. The paper from the French society will be by P. J. LeThomas on stresses in copper alloys. The Australian exchange paper will deal with austenitic manganese steel technology. Other foreign papers will cover such subjects as technical advancements in brass and bronze, temper embrittlement in nodular iron, and controlled gas content in foundry work.

Shop Courses—Discussions of a practical nature will be presented at three shop courses. "Graphitization Theory and Mechanics" is the subject of the Malleable Division's program Monday evening,



at Cincinnati

to be handled by an eight-member panel. On Tuesday evening, five panelists will discuss sand control, quality and economy at the Sand Shop Course. The Gray Iron Shop Course on Thursday evening will be devoted to "Basic Microstructures as Steps to Quality Castings."

Business Meeting — AFS President Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill., will preside at the annual business meeting Wednesday morning. Program for this session will include the president's annual address, apprentice contest awards, presentation of the new Awards of Scientific Merit and Service Citations (see Page 196) and election of officers and directors. Nominees to be voted on at this meeting include:

For president, Harry W. Dietert, board chairman, Harry W. Dietert Co., Detroit; for vice president, Lewis H. Durdin, president, Dixie Bronze Co., Birmingham. For directors to serve three years:

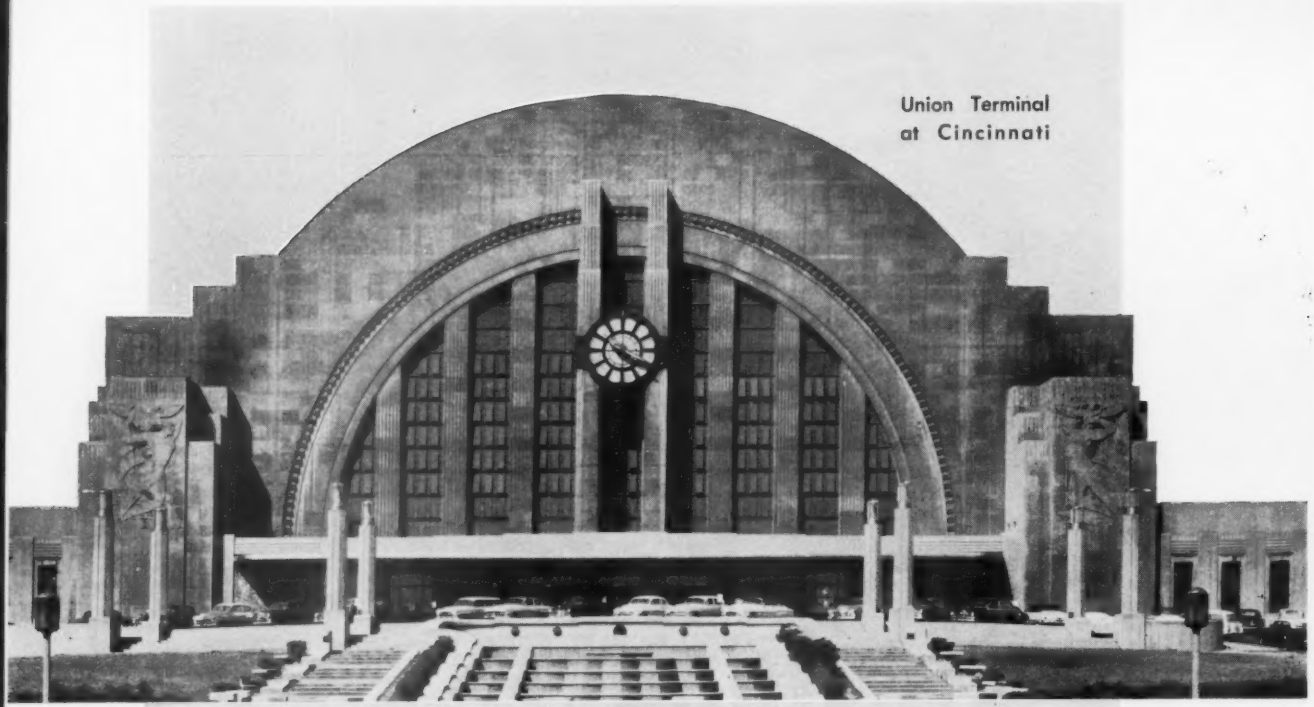
Henry G. Stenberg, foundry superintendent, Draper Corp., Hopedale, Mass.; A. A. Hochrein, district manager, American Smelting & Refining Co., Baltimore; William D. Dunn, assistant to the president, Oberdorfer Foundries Inc., Syracuse, N. Y.; Fred J. Pfarr, manager, Lake City Malleable Co., Cleveland; Karl L. Landgrebe Jr., general manager, Foundry Division, Wheland Co., Chattanooga, Tenn.; John R. Russo, president, Russo Foundry Equipment Co., Oakland, Calif.

Annual Dinner—The society's annual gold medal and life membership presentations will be made at the annual dinner, to be held Wednesday evening at the Netherland-Hilton Hotel. Featured speaker at the dinner will be Warren Whitney, vice president, James B. Clow & Sons Inc., Birmingham. Mr. Whitney, who has been in the foundry industry since joining the Clow company in 1937, has spoken frequently throughout the country on various phases of business. His subject will be "The Seventh Inning Stretch."

Chapter Participation—Several committees have been appointed by the AFS Cincinnati Chapter to handle certain of the week's activities. These committees (Pages 194-195) are under the general chairmanship of Edward H. King, vice president, the Hill & Griffith Co., Cincinnati.

One committee has arranged for a number of plants in the area to be open for visitors' inspection during the congress. In some cases the plants also may be visited before and after convention week. Plants and hours of visitation are listed on Page 191.

Entertainment of ladies attending the convention will be provided by a special program which opens Monday afternoon with the official AFS tea at the Netherland-Hilton. Other events, in addition to the annual dinner, will include a luncheon and style show Tuesday noon at the Sinton Hotel, and an Ohio River cruise and luncheon aboard an excursion boat on Thursday.



Union Terminal at Cincinnati

AFS Congress Program

MONDAY, MAY 6

7:30 a.m.—Authors' Breakfast (Netherland-Hilton Hotel)

8:30 a.m.—Registration.

9:00-5:30—Exhibits open.

9:00 a.m.—Malleable Session (Music Hall)

Comparison of Properties of Liquid and Air Quenched Pearlitic Malleable Iron—Report of Committee 6E—R. W. Heine, University of Wisconsin, Madison, Wis.

Combustion Control in Duplex Air Furnace Practice—L. E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind.

Some Observations on Galvanizing Embrittlement of Malleable Iron—R. W. Sandelin, Conners Steel Division, H. K. Porter Co., Birmingham.

9:00 a.m.—Pattern Session (Music Hall)

Metal Corebox Equipment—W. E. Mason, Westinghouse Air Brake Co., Wilmerding, Pa.

Engineering Aids for Sealing Coreboxes Against Blowbys—R. L. Olson, Dike-O-Seal Inc., Chicago.

9:00 a.m.—Steel Session (Netherland-Hilton)

Welding Steel Casting with Carbon Dioxide as a Shielding Agent—J. J. Chyle, A. O. Smith Corp., Milwaukee.

Effect of Carbon and Manganese on Properties of Constructional Steels for Dynamic Loading—R. D. Engquist, American Steel Foundries, East Chicago, Ind.

Hydrogen as it Affects Steel Castings—A. E. Gross, Ohio Steel Foundries, Springfield, O.

9:00 a.m.—Statistical Methods for the Foundry Industry (Netherland-Hilton)

Statistics at General Electric—J. H. Davidson, General Electric Co., Schenectady, N. Y.

Administrative Engineering Applications of Statis-

tical Methods—J. L. Dolby, General Electric Co., Schenectady, N. Y.

A Foundry Application of the Master Control System—N. P. Demos, General Electric Co., Schenectady, N. Y.

12:00 noon—Steel Roundtable Luncheon (Netherland-Hilton)

Subject: *Most Interesting to Steel Foundrymen*

2:30 p.m.—Castings Engineering (Music Hall)

Subject: *An Automotive Engineer Views the Foundry.* Speaker: H. F. Barr, Chevrolet Motor Division, General Motors Corp., Detroit.

4:00 p.m.—Safety, Health and Legislation Session (Netherland-Hilton)

Institute of British Foundrymen Official Exchange Paper. *Health and Safety*—Sir George Barnett, Ministry of Labor, England.

Legislation Affecting Foundries—H. J. Weber, AFS.

4:00 p.m.—Fundamental Papers Session (Netherland-Hilton)

The Fluidity of a Series of Magnesium Alloys—J. E. Niesse, M. C. Flemings, and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

The Fluidity of Some Aluminum Alloys—S. Floreen and D. V. Ragone, University of Michigan, Ann Arbor, Mich.

Influence of Vibration on Solidifying Metals—A. H. Freedman and J. F. Wallace, Case Institute of Technology, Cleveland.

Investigation of Metallurgical and Mechanical Effects in Development of Hot Tearing—H. F. Bishop, C. C. Ackerlind and W. S. Pellini, Naval Research Laboratory, Washington. (H. F. Bishop now with Exomet Inc., Conneaut, O.)

4:00 p.m.—Sand Session (Music Hall)

New Techniques for Finding "Come and Go" Causes That Affect Quality—E. C. Zuppann, Oliver Corp., South Bend, Ind.

How To Determine Moisture Requirements of Molding Sands—R. W. Heine, University of Wisconsin, Madison, Wis. and E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati.

8:00 p.m.—Malleable Shop Course (Netherland-Hilton)

Subject: *Graphitization Theory and Mechanics. Effects of Chemistry and Melting Conditions on Overall Cycles.* Panel members: F. W. Jacobs, Texas Foundries Inc., Lufkin, Tex.; J. T. Bryce, Albion Malleable Iron Co., Albion, Mich.; L. R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill.; G. B. Mannweiler, Eastern Malleable Iron Co., Naugatuck, Conn.; W. J. Amsbary, Ohio Brass Co., Mansfield, O.; L. E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind.; W. A. Zeunik, National Malleable & Steel Castings Co., Indianapolis; and C. R. Sorensen, National Malleable & Steel Castings Co., Cicero, Ill.

TUESDAY, MAY 7

7:30 a.m.—Author's Breakfast (Netherland-Hilton)

8:30 a.m.—Registration.

9:00-5:30—Exhibits open.

9:00 a.m.—Pattern Session (Netherland-Hilton)

Cast Epoxy Pattern Equipment—J. Templeman, Templeman Pattern & Model Co., Chicago.

Plastics in Pattern Making—H. Burton, Canadian Steel Foundries Ltd., Montreal, Que.

9:00 a.m.—Hearing and Radiation Session (Netherland-Hilton)

Loss of Hearing May Cost You Money—Dr. P. J. Whitaker, Allis-Chalmers Mfg. Co., Milwaukee.

Radiation Is Hazardous—F. A. Van Atta, National Safety Council, Chicago.

9:00 a.m.—Statistical Methods for the Foundry Industry (Netherland-Hilton)

Quality Control in a Small Foundry—J. J. Henry, Missouri Steel Castings Co., Joplin, Mo.

Fractional Replication in Melting Experiments—J. Hromi, U. S. Steel Corp.

Statistical Techniques for Attainment of Optimum Processing Condition—A. M. Schneider, American Cyanamid Co., Stamford, Conn.

9:00 a.m.—Steel Session (Music Hall)

Steel Foundry Industry Behind the Iron Curtain—A. J. Kiesler, General Electric Research Laboratory, Schenectady, N. Y.

Austenitic Manganese Steel Technology in Australia—Hedley Thomas, Industrial Steels Ltd., Australia. Presented by H. E. Cragin Jr., Taylor-Wharton Co., High Bridge, N. J.

Grain Refinement of Stainless Steel Castings—J. L. Walker, General Electric Research Laboratory, Schenectady, N. Y.

12:00 noon—Malleable Roundtable Luncheon (Netherland-Hilton)

Subject: *Castings from the User's Standpoint.* Speaker: Thomas Logan, Caterpillar Tractor Co., Peoria, Ill.

12:00 noon—Pattern Roundtable Luncheon (Netherland-Hilton)

Subject: *European Foundries and Pattern Shops.* Speaker: E. T. Kindt, Kindt-Collins Co., Cleveland.

2:30 p.m.—Fundamental Papers Session (Netherland-Hilton)

Adhesion of Phenol-Formaldehyde to Various Refractory Oxides—J. K. Sprinkle and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Effect of Gaseous and Solid Addition Elements on Surface Tension and Contact Angles (on Graphite) of Various Iron Carbon Alloys—J. Keverian, General Electric Co., Schenectady, N. Y., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Action of Ferrosilicon as Inoculant in Cast Iron and Effect of Magnesium on Formation of Nuclei—Fredrik Hurum, A/s Bjolvefossen, Oslo, Norway.

2:30 p.m.—Light Metals Session (Music Hall)

Expendable Graphite Molds for Production of Titanium Castings—A. L. Field, E. I. DuPont de Nemours & Co., and R. E. Edelman, Frankford Arsenal, Philadelphia.

Status of Technology for Casting Titanium—G. H. Schippereit, R. M. Lang and J. G. Kura, Battelle Memorial Institute, Columbus, O.

Mechanical Properties of Cast Titanium-Iron and Titanium-Aluminum-Iron Alloys—N. Hehner, H. W. Antes, and R. E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia. (N. Hehner now with National Lead Co.)

2:30 p.m.—Sand Session (Music Hall)

Practical Studies of Veining Tendencies—George DiSylvestro, Burnside Steel Foundry Co., Chicago.

Effect of Various Clays and of Tempering Method on Sand Properties and Casting Quality—A. E.

Murton, Dept. of Mines & Technical Surveys, Ottawa, Ont.

2:30 p.m.—Pattern Session (Netherland-Hilton)

The Patternmakers' Application of Plastics in Industry—J. F. Roth, Cleveland Standard Pattern Works, Cleveland.

Wear Characteristics of Plastic Pattern Materials—M. K. Young, U. S. Gypsum Co., Chicago.

Panel Discussion.

4:00 p.m.—Malleable Session (Netherland-Hilton)

Effects of Charge Materials and Melting Conditions on Properties of Malleable Iron—E. H. Belter and R. W. Heine, University of Wisconsin, Madison, Wis.

New Foundry Testing Methods—C. A. Koerner, Central Foundry Division, General Motors Corp., Saginaw, Mich.

Investigation of Effect of Processing Variables on Properties of Pearlitic Malleable Iron—H. H. Johnson and W. K. Bock, National Malleable & Steel Castings Co., Cleveland.

7:00 p.m.—Canadian Dinner (Sheraton-Gibson Hotel)

7:00 p.m.—Sand Division Dinner (Netherland-Hilton)

Subject: *Controlling Quality on the Chevrolet Cylinder Block Casting.* Speaker: W. C. Schartow, Chevrolet-Saginaw Grey Iron Foundry Division, General Motors Corp., Saginaw, Mich.

8:00 p.m.—Sand Shop Course (Netherland-Hilton)

Subject: *Sand Control—Quality—Economy.* Panel members: J. B. Caine, consultant, Cincinnati; R. E. Daine, Aluminum Co. of America, Cleveland; M. H. Horton, Deere & Co., Moline, Ill.; F. B. Rote, Albion Malleable Iron Co., Albion, Mich.; and G. F. Watson, American Brake Shoe Co., Mahwah, N. J.

WEDNESDAY, MAY 8

7:30 a.m.—Authors' Breakfast (Netherland-Hilton)

8:30 a.m.—Registration.

9:30 a.m.—AFS Annual Business Meeting (Music Hall)

President's annual address; apprentice contest awards; election of officers and directors.

10:00 a.m.—Charles Edgar Hoyt Memorial Lecture (Music Hall)

Subject: *Progress in Iron Castings.* Speaker: Hyman Bornstein, Moline, Ill.

11:30-5:30—Exhibits open

12:00 noon—Management Luncheon (Netherland-Hilton)

Subject: *Development of Foundry Management.* Speaker: W. J. Grede, Grede Foundries Inc., Milwaukee. Discussion panel: W. J. Grede, moderator; H. A. Forsberg, Continental Foundry & Machine Co. Division, Blaw-Knox Co., East Chicago, Ind.; L. J. Wise, Chicago Malleable Castings Co., Chicago; H. W. Johnson, Wells Mfg. Co., Skokie, Ill.; and C. K. Faunt, Christensen-Olsen Foundry Co., Chicago.

2:30 p.m.—Education Session (Netherland-Hilton)

The Coming Foundry Manpower Shortage—J. S. McCauley, U. S. Department of Labor, Washington.

2:30 p.m.—Gray Iron Session (Netherland-Hilton)

Inoculation of Cast Gray Iron—N. C. McClure, Dow Chemical Co., Midland, Mich.; A. U. Khan, Whirlpool & Seeger Corp., St. Joseph, Mich.; D. D. McGrady and H. L. Womochel, Michigan State University, East Lansing, Mich.

Tin as a Useful Alloy in Gray Cast Iron—J. A. Davis, Battelle Memorial Institute, Columbus, O.

Carbon Refractories—G. B. Tatum, National Carbon Co., Cleveland.

2:30 p.m.—Light Metals Session (Music Hall)

Aging Practice for Aluminum Alloy HP 356—A. B. DeRoss, Kaiser Aluminum & Chemical Sales Inc., Chicago.

Performance of Chills on High Strength-High Ductility Sand-Mold Castings of Various Section Thicknesses—M. C. Flemings, P. J. Norton and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Rigging Design for Typical High Strength, High Ductility Alloy Aluminum Casting—M. C. Flemings, P. J. Norton and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Effect of Small Tin and Cadmium Additions to Binary Aluminum-Rich Copper Alloys—H. V. Sulinski, R. C. Harris and S. Lipson, Frankford Arsenal, Philadelphia.

Intricate Small Diameter Coring for Aluminum and Magnesium Castings—R. F. Dalton, Howard Foundry Co., Chicago.

2:30 p.m.—Sand Session (Music Hall)

Mold Hardness: What It Means!—R. W. Heine, University of Wisconsin, Madison, Wis.; and E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati.

Influence of Sand Grain Distribution on Green Sand Casting Finish—C. E. McQuiston, Advance Foundry Co., Dayton, O.

European Self-Curing Oil Binders—Dr. Franz Moser, Oel & Chemie Werk A.G., Hausen b/Brugg, Switzerland.

7:00 p.m.—AFS Annual Dinner (Netherland-Hilton)

Presentation of AFS Gold Medal Awards and Honorary Life Memberships.

Subject: *The Seventh Inning Stretch.* Speaker: Warren Whitney, National Cast Iron Pipe Division, James B. Clow & Sons, Birmingham.

THURSDAY, MAY 9

7:30 a.m.—Author's Breakfast (Netherland-Hilton)

8:30 a.m.—Registration.

9:00-5:30 p.m.—Exhibits open.

9:00 a.m.—Brass and Bronze Session (Netherland-Hilton)

Pressure Tightness of 85-5-5-5 Bronze Castings—Brass and Bronze Research Progress Report.

Fracture Characteristics of Copper-Base Alloys—N. C. Howells and E. A. Lange, Naval Research Laboratory, Washington.

9:00 a.m.—Gray Iron Session (Music Hall)

Gating of Gray Iron Castings—J. F. Wallace and E. B. Evans, Case Institute of Technology, Cleveland.

Feed Metal Requirements for Nodular Iron Castings—C. Reynolds, J. Maitre and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. (J. Maitre now at United States Steel Corp., Johnstown, Pa.)

Welding of Gray, Nodular, and Malleable Iron—Re-

port of Joint AWS-AFS Committee.

9:00 a.m.—Heat Transfer Session (Netherland-Hilton)
Some Generalized Solidification Studies—V. Paschkis and J. W. Hlinka, Columbia University, New York.
Temperature Drop in Pouring Ladles—V. Paschkis and J. W. Hlinka, Columbia University, New York.

12:00 noon—Light Metals Roundtable Luncheon (Netherland-Hilton)
Subject: *Engineered Light Metal Castings.* Panel Members: Fred Mason, Chrysler Corp., Detroit; C. M. Curtis, Maytag Co., Newton, Iowa.

2:30 p.m.—Brass and Bronze Session (Music Hall)
Subject: *Castings Design Clinic.* Panel Members: F. L. Riddell, H. Kramer & Co., Chicago—*Gating;* G. F. Watson, American Brake Shoe Co., Mahwah, N. J. and R. A. Colton, American Smelting & Refining Co., Federated Metals Division, Newark, N. J.—*Design of Castings.*

2:30 p.m.—Education Session (Netherland-Hilton)
Subject: *Meeting Your Manpower Needs.* (a) Foundry Instructors Seminar—W. H. Ruten, Brooklyn Polytechnic Institute, Brooklyn, N. Y.; (b) AFS Training & Research Institute—S. C. Massari, AFS; (c) Chapter Educational Activities—E. J. Romans, National Malleable & Steel Castings Co., Cleveland.

2:30 p.m.—Industrial Engineering Session (Netherland-Hilton)
Improving Foundry Layout—R. B. Sinclair, Meehanite Metal Corp., New Rochelle, N. Y.
Material Handling—Ralph Peterson, Pangborn Corp., Pangborn, Md.
Motion Picture: *Value of Standard Data*—John Deere-Van Brunt Co., Horicon, Wis.

2:30 p.m.—Sand Session (Music Hall)
Properties of Molding Sands Under Conditions of Gradient Heating—N. C. Howells, R. E. Morey and H. F. Bishop, Naval Research Laboratory, Washington. (H. F. Bishop now with Exomet Inc., Conneaut, O.)
Influence of Various Bonding Materials on Stress-Strain Characteristics of Bonded Sands—F. Quig-

View of downtown Cincinnati shows some of the city's prominent buildings. The Ohio River is visible in the upper right corner

Fountain Square is a famous Cincinnati landmark. The Netherland-Hilton Hotel is in the background

ley and P. J. Ahearn, Watertown Arsenal, Watertown, Mass.; and J. F. Wallace, Case Institute of Technology, Cleveland.

Oil-Bonded Molding Sand—K. A. Miericke and R. C. Megaw, Baroid Division, National Lead Co., Chicago.

4:00 p.m.—Light Metals Session (Netherland-Hilton)

Fatigue Properties of Two Aluminum Die Casting Alloys—G. W. Stickley and J. L. Miller, Aluminum Co. of America, Pittsburgh.

Corrosion of Aluminum Die Castings—D. L. Colwell and R. J. Kissling, Apex Smelting Co., Cleveland.

Vacuum Die Casting Today and Tomorrow—D. Morgenstern, Nelmor Mfg. Co., Euclid. O.

Automatic Metering of Magnesium for Cold Chamber Die Casting—F. L. Burkett and F. L. Bennett, Dow Chemical Co., Midland, Mich.

8:00 p.m.—Brass and Bronze Session (Netherland-Hilton)

Co-operation for Technical Advancement in the British Bronze and Brass Foundry Industry—A. H. R. French, J. Stone & Co., and E. C. Mantle, British Non-Ferrous Metals Research Association, England. Presented by R. W. Ruddell.

Relation of Microhardness and Stresses in Copper Alloys—French Official Exchange Paper. P. J. LeThomas, Association Technique de Fonderie, Paris, France.

8:00 p.m.—Gray Iron Shop Course (Netherland-Hilton)

Subject: *Basic Microstructures as Steps to Quality Castings.* Speaker: L. L. Clark, Armour Research Foundation, Chicago.

FRIDAY, MAY 10

7:30 a.m.—Authors' Breakfast (Netherland-Hilton)

8:30 a.m.—Registration.

9:00-3:30 p.m.—Exhibits open.

9:00 a.m.—Brass and Bronze Roundtable Breakfast (Netherland-Hilton)

Subject: *Carbon Dioxide Process in the Brass Foundry.* Panel: P. H. Ducharme, Doran Manganese Bronze-Columbian Bronze Corp., Brooklyn, N. Y.; J. E. Gotheridge, Foundry Services Inc., Columbus, O.; and C. E. Koehler, Hamilton Brass & Aluminum Castings Co., Hamilton, O.

9:00 a.m.—Gray Iron Session (Netherland-Hilton)

Temper Embrittlement in Nodular Cast Irons—G. N. J. Gilbert, British Cast Iron Research Association, Birmingham, England.

Nickel Alloyed Normalized Nodular Irons—C. R. Isleib and R. E. Savage, International Nickel Co., Bayonne, N. J.

9:00 a.m.—Heat Transfer Session (Netherland-Hilton)

Transport of Feed Metal During Solidification of Tapered Steel Bars—E. J. Sullivan, C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

Flow of Heat From Sand Castings by Conduction, Radiation and Convection—C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.

9:00 a.m.—Light Metals Session (Music Hall)

Effect of Vacuum and Nitrogen Degassing on Properties of Cast Aluminum-Silicon-Magnesium Alloy—R. K. Owens, H. W. Antes and R. E. Edelman, Frankford Arsenal, Philadelphia.

Controlled Gas Content in Foundry Work—E. Scheuer, International Alloys Ltd., Haydon Hill, Aylesbury, Bucks., England. (To be presented by D. L. Colwell.)

Effect of Various Factors on Mechanical Properties of Magnesium Casting Alloys—J. W. Meier and A. Couture, Dept. of Mines and Technical Surveys, Ottawa, Ont.

Hot Tearing of Some Magnesium Casting Alloys—R. A. Dodd, W. A. Pollard and J. W. Meier, Dept. of Mines and Technical Surveys, Ottawa, Ont.

12:00 noon—Gray Iron Roundtable Luncheon (Netherland-Hilton)

Subject: *Economical Casting Design and Production.* Speaker: G. W. Schuller Jr., Caterpillar Tractor Co., Peoria, Ill.

2:30 p.m.—Brass and Bronze Session (Netherland-Hilton)

Effect of Geometry on Properties of Gun-Metal Cast-

ings—A Progress Report—W. H. Johnson, Battelle Memorial Institute, Columbus, O.

Production and Properties of Iron and Aluminum Alloyed Cast Cupro-Nickel—G. L. Lee, International Nickel Co., Bayonne, N. J.

2:30 p.m.—Gray Iron Shop Course (Netherland-Hilton)

Subject: *Inoculation As a Step to Quality Castings*—D. E. Krause, Gray Iron Research Institute, Columbus, O.

2:30 p.m.—Industrial Engineering Session (Netherland-Hilton)

An Appeal to Foundry Executives—J. A. Wagner, Wagner Malleable Iron Co., Decatur, Ill.

The Use of Memotion in Setting Foundry Standards—L. L. Randolph, American Steel Foundries, Granite City, Ill.

Motion Picture: *The First Five Million Miles*—American Brake Shoe Co., Calera, Ala.

2:30 p.m.—Sand Session (Netherland-Hilton)

Effect of Temperature on the pH of Foundry Sands—M. D. Brickman, Process Development Section, General Motors Corp., Detroit; and Gordon Gottschalk, Thiem Products Inc., Milwaukee.

Correlation Between Casting Surface and Hot Properties of Molding Sands—AFS Committee 8J, J. A. Gitzen, chairman, Delta Oil Products Co., Milwaukee.

Plants Open for Inspection During AFS Congress

Foundry	Open before Convention	Open after Convention	May 6-10 Visiting Days M	T	W	T	F	Visiting Hours	Limit
CINCINNATI									
Buckeye Foundry Co.	—	—		x		x		2-4:30	10*
Cincinnati Milling Machine Co.	—	—		x		x		2-4	100
Griffin Wheel Co.	5 a.m.-3:30 p.m.		x	x	x	x	x	**(see note)	30
Oberhelman-Ritter Foundry Co.	***	***	x	x	x	x	x	9-10:30	5*
OPW Corp.	—	—	x	x				9-11	25
Oakley Pattern & Foundry Co.	—	—		x	x	x		9-3	10
Wm. Powell Co.	—	—			x	x		9-11, 1-3	15
Reliance Foundry Co.	—	—			x	x	x	10-11, 2-3	10*
Sawbrook Steel Castings Co.	—	—		x	x			T 1-3:30, W 9:30-12	—
DAYTON, O.									
Advance Foundry Co.	any date, 9-5		x	x	x	x	x	9-5	10*
Dayton Castings Co.	May 1-3 9-3	May 13-15 9-3	x	x	x	x	x	9-3	None
G. H. R. Foundry Division	—	—		x	x			9-2:30	—
HAMILTON, O.									
Black-Clawson Co.	***	***	x	x	x	x	x	9:30-11:30, 1:30-3:30 10-12	—
H. P. Deuscher Co.	—	—	x	x	x	x	x	8-12	—
Hamilton Brass & Aluminum Castings Co.	May 1-3 9-12	May 13-17 9-12	x	x	x	x	x	9-12	8*
Hamilton Foundry & Machine Co.	—	—	x	x		x	x	9-11:30, 1:30-3:30 12-16	—
INDIANAPOLIS									
International Harvester Co.	9:30, 1:30-2		x	x	x	x	x	9:30-10, 1:30-2	10*
Link-Belt Co.	May 3 9:30 or 1:30	May 13 9:30 or 1:30	x	x	x	x	x	9:30 or 1:30	None
LOUISVILLE									
International Harvester Co.	Apr. 29-May 3 9-2	May 13-17 9-2	x	x	x	x	x	9-2	None

*Except by special arrangement during convention.
**Check at convention for visiting hours and pouring days.
***By appointment for visits before or after convention.

Cincinnati Music Hall, site of the First Engineered Castings Show

LIST OF EXHIBITORS

(Corrected as of April 5)

Advance Foundry Co., Dayton, O.
Ajax Metal Division, H. Kramer & Co., Philadelphia
Al-Fin Division, Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.
Alloy Steel Castings Co., Division Fisher & Porter, Southhampton, Pa.
Alten Foundry & Machine Works, Inc., Lancaster, O.
Aluminum Co. of America, Pittsburgh
Aluminum Permanent Mold Co., Grand Rapids, Mich.
American Alloys Corp., Kansas City, Mo.
American Brake Shoe Co., Engineered Castings Division, New York
American Light Alloys Inc., Little Falls, N. Y
American Smelting & Refining Co., Federated Metals Division, New York
Apex Smelting Co., Chicago
Arrow Aluminum Castings Co., Cleveland
Arwood Precision Casting Corp., Brooklyn, N. Y.
G. A. Avril Co., Cincinnati
Badger Malleable & Mfg. Co., South Milwaukee, Wis.
Morris Bean & Co., Yellow Springs, O.
Bendix Foundries, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.
Brown Foundry Corp., Camden, N. J.
Brush Beryllium Co., Cleveland
Buckeye Foundry Co., Cincinnati
Budd Co., Nuclear Systems Division, Philadelphia
Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Century Foundry, St. Louis
Chicago Foundry Co., Chicago
City Pattern & Foundry Co., South Bend, Ind.
Climax Molybdenum Co., New York
Dayton X-ray Co., Dayton, O.
Devcon Corp., Danvers, Mass.

THE First Engineered Castings Show will be held at Cincinnati Music Hall, May 6-10, in conjunction with the 61st Castings Congress of the American Foundrymen's Society. It will emphasize the bringing together of casting designers, purchasers and foundrymen, offering each group an opportunity to present its problems and become acquainted with the needs and difficulties facing the other groups.

Technical or nontechnical questions and answers concerning techniques and applications can be exchanged between visitors and exhibitors. The show will feature displays of numerous products, demonstrating typical applications. Emphasis will be placed on the many advantages and versatility of cast metal as an engineering material.

Several foundries plan to show parts they have cast. Many of those exhibits will feature castings which have replaced parts made by competitive methods of fabrication, with emphasis on the castings' high quality, utility and economy.

To further the theme for promotion of castings, exhibitors have been limited to producers of castings for sale; producers of patterns for sale; manufacturers of laboratory, testing and inspection equipment for control of casting quality, and producers of metals and alloys.

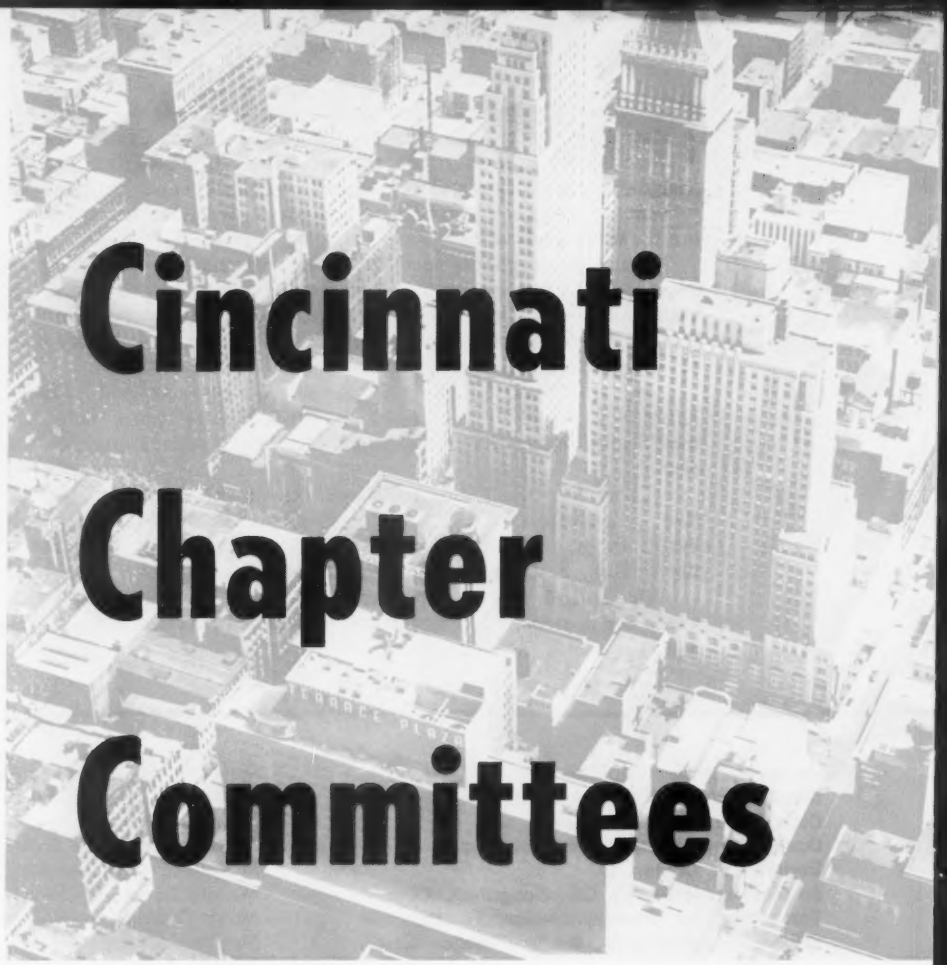
One foundry exhibitor plans a promotional stunt with high educational value for designers, engineers and buyers of castings. The company will offer a closed-circuit, live television showing of its foundry operation.

Harry W. Dietert Co., Detroit
Dike-O-Seal Inc., Chicago
Dixie Bronze Co., Birmingham
Doehler-Jarvis Division, National Lead Co., Toledo, O.
Duriron Co., Dayton, O.
Eastern Malleable Iron Co., Naugatuck, Conn.
Eaton Mfg. Co., Foundry Division, Vassar, Mich.
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.
Eder Instrument Co., Chicago
Electro Minerals Division, Carborundum Co., Niagara Falls, N. Y.
Chris Erhart Foundry & Machine Co., Cincinnati
Fabricast Division, General Motors Corp., Bedford, Ind.
Fairchild Engine & Airplane Corp., Al-Fin Division, Farmingdale, L. I., N. Y.
Federated Metals Division, American Smelting & Refining Co., New York
Fisher & Porter, Alloy Steel Castings Co., Division, Southampton, Pa.
General Motors Corp., Fabricast Division, Bedford, Ind.
Gibson & Kirk Co., Baltimore, Md.
Grede Foundries Inc., Milwaukee
Samuel Greenfield Co., Buffalo
Hamilton Brass & Aluminum Castings Co., Hamilton, O.
Hamilton Foundry & Machine Co., Hamilton, O.
Benj. Harris & Co., Chicago Heights, Ill.
Hica Inc., Shreveport, La.
Howard Foundry Co., Chicago
International Nickel Co., New York
Janney Cylinder Co., Philadelphia
Kaiser Aluminum & Chemical Sales Inc., Chicago
Keokuk Steel Castings Co., Keokuk, Iowa
King Tester Corp., Philadelphia
H. Kramer & Co., Chicago
R. Lavin & Sons Inc., Chicago
Lebanon Steel Foundry Co., Lebanon, Pa.
Love Brothers Inc., Aurora, Ill.
Lynchburg Foundry Co., Lynchburg, Va.
Magnaflux Corp., Chicago
Magnet Cove Barium Corp., Houston, Tex.
Martin Grinding & Machine Works Inc., Chicago
Meehanite Metal Corp., New Rochelle, N. Y.
Mid-Continent Steel Casting Corp., Shreveport, La.
Midwestern Foundries Inc., Garrett, Ind.
Modern Pattern & Plastics Inc., Toledo, O.
Motor Castings Co., Milwaukee
Mueller Industries Inc., Aurora, Ill.
Nassau Smelting & Refining Co., Staten Island, N. Y.
National Engineering Co., Chicago
National Lead Co., Doehler-Jarvis Division, Toledo, O.
Nonferrous Foundries Inc., Indianapolis
Nuclear Systems Division, Budd Co., Philadelphia
Oregon Metallurgical Corp., Division Symington-Gould Corp., Albany, Oreg.
Peerless Foundry Co., Cincinnati
Peoria Malleable Castings Co., Peoria, Ill.
Precision Metal Molding, Cleveland
Pressco Casting & Mfg. Corp., Chesterton, Ind.
Pyott Foundry & Machine Co., Aurora, Ill.
Quality Aluminum Casting Co., Waukesha, Wis.
Reliable Castings Corp., Cincinnati
Roessing Bronze Co., Pittsburgh
Rolle Mfg. Co., Lansdale, Pa.
I. Schumann & Co., Cleveland
Scientific Cast Products Corp., Cleveland
Sipi Metals Corp., Chicago
Sivyer Steel Castings Co., Milwaukee
Southern Precision Pattern Works Inc., Birmingham
Sterling Casting Corp., Bluffton, Ind.
Superior Foundry Inc., Cleveland
Swedish Crucible Steel Co., Detroit
Symington-Gould Corp., Depew, N. Y.
United States Gypsum Co., Chicago
Universal Castings Co., Chicago
Wadsworth Foundry Co., Wadsworth, O.
Wagner Malleable Iron Co., Decatur, Ill.
Waukesha Foundry Co., Waukesha, Wis.
Wilmington Casting Co., Wilmington, O.
Zenith Foundry Co., Milwaukee

E. H. King

R. J. Westendorf

E. J. James



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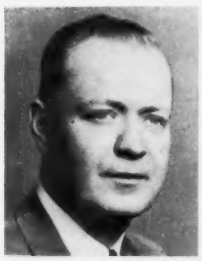
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AFS Creates

Scientific and Service Work To Be Recognized

TWO new types of awards will be presented by the American Foundrymen's Society this year at the Cincinnati Congress. In addition to the annual Gold Medal presentations, the society has created an Award of Scientific Merit — in recognition of outstanding technical achievement in the castings industry—and a Service Citation to honor individuals for unusual service to the AFS and industry.

Gold Medals—Johannes C. A. Croning, Croning & Co., Hamburg-Altona, Germany, will receive the John A. Penton Gold Medal.

Charles K. Donoho, chief metallurgist, American Cast Iron Pipe Co., Birmingham, has been designated the Peter L. Simpson Gold Medalist.

Clyde A. Sanders, vice president, American Colloid Co., Chicago, will be awarded the John H. Whiting Gold Medal.

Award of Scientific Merit—This award will go to the following four men:

Manley E. Brooks, foundry engineer, Magnesium Dept., Dow Chemical Co., Bay City, Mich.

Richard W. Heine, associate professor of mining and metallurgical engineering, University of Wisconsin, Madison, Wis.

Walter R. Jaeschke, consulting metallurgical engineer, Whiting Corp., Harvey, Ill.

Arthur E. Schuh, director of research and development, United States Cast Iron Pipe Co., Burlington, N. J.

Service Citation—Winners of this award include:

Thomas E. Barlow, sales manager, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago.

Horace A. Deane, vice president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

Vincent Delport, treasurer, Penton Publishing Co. Ltd., London, and European editor, FOUNDRY.

Honorary Life Membership—Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill., will receive an AFS honorary life membership as retiring president of the American Foundrymen's Society.

The Awards of Scientific Merit and the Service Citations will be presented at the AFS annual business meeting the morning of May 8 in the Cincinnati Music Hall. Awarding of gold medals and honorary life membership will be made that evening at the annual dinner in the Netherland-Hilton Hotel.

New Awards

GOLD MEDALS

JOHANNES C. A. CRONING

JOHANNES C. A. CRONING, as recipient of the John A. Penton Gold Medal, is being honored "for his outstanding contribution to the foundry industry in the invention of the shell molding process for production of metal castings." He attended the Maschinenbauschule, Hamburg-Altona, Germany. His early work, the development and manufacture of cylinder locks, acquainted him with foundry casting methods. At a laboratory in his home he devoted considerable time to the development of molding and coremaking methods which would produce close-tolerance castings requiring minimum machining. This experimental work led to the shell process for which he was granted a German patent in 1944.

CHARLES K. DONOHO

CHARLES K. DONOHO will receive the Peter L. Simpson Gold Medal "for outstanding contributions to the society and to the ferrous castings industry, especially in the fields of gray iron, nodular iron and steel." Mr. Donoho, graduated from Vanderbilt University in 1930, received his master's degree the following year, when he joined American Cast Iron Pipe Co. He has served as chemist, metallographer, in sales engineering, and as melting superintendent and plant metallurgist. He has been chief metallurgist since 1947 and also assistant technical director since early 1956. Mr. Donoho is chairman of the AFS Gray Iron Division, a member of the Papers Committee, Steel Division, and was chairman, Birmingham District Chapter, 1951-52.

CLYDE A. SANDERS

CLYDE A. SANDERS has been named recipient of the John H. Whiting Gold Medal "for outstanding contributions to the society and the castings industry in development and dissemination of fundamental data concerning the use of foundry molding sands." Mr. Sanders was graduated as a ceramic engineer from Ohio State University and, under the state geologist, was active in the development of Ohio clays. In 1942 he joined the American Colloid Co., Chicago, and was elected vice president in 1949. Mr. Sanders is well known for his talks on foundry sand control before AFS chapters and is the author of *Foundry Sand Practice*. He has served for many years on several Sand Division committees and was chairman of its Executive Committee in 1952-53.

MANLEY E. BROOKS

RICHARD W. HEINE

WALTER R. JAESCHKE

DR. ARTHUR E. SCHUH

SCIENTIFIC MERIT

MANLEY E. BROOKS is being honored "for technical assistance to the AFS Light Metals Division since its inception, and to the castings industry, especially in the field of magnesium alloys." Mr. Brooks, a pioneer in the magnesium casting industry, joined Dow Chemical Co. more than 35 years ago. Since then, with the exception of a short time as foundry engineer for Alloy Products Co., Compton, Calif., in 1949, Mr. Brooks has been with the Magnesium Department of Dow at Bay City, Mich. An active member of the Light Metals Division since its organization, he was vice chairman of its Executive Committee in 1947-49.

RICHARD W. HEINE is being honored "for valuable assistance to AFS research on malleable cast iron as it relates to the effect of melting conditions on metal behavior." Mr. Heine, graduated from Wayne State University, received a master's degree in 1948 from the University of Wisconsin where he is associate professor of metallurgical engineering. Professor Heine has supervised foundry industry research; has prepared many technical articles, and is co-author of a college textbook on principles of metal casting. He is chairman of the Pearlitic Malleable Committee of the AFS Malleable Division and a member of two Sand Division committees and the Fundamental Papers Committee.

WALTER R. JAESCHKE is being honored "for substantial contributions to the development of cupola and air furnace melting of malleable iron, and to broader foundry knowledge of refractories." Mr. Jaeschke studied chemical engineering at Armour Institute of Technology and originally joined Whiting Corp. in 1919. For a time he was with the petroleum industry, returning to Whiting in 1926. He has been with its Foundry Equipment Division since 1934. Mr. Jaeschke is well known for his talks on cupola operation and malleable melting. Long active on AFS technical committees, he is chairman of the Refractories Manual Committee and is a member of the Cupola Advisory Committee.

ARTHUR E. SCHUH is being honored "for conscientious effort in AFS cupola research investigations, and in development of the society's basic ferrous publication *The Cupola and Its Operation.*" Dr. Schuh, graduated from the University of Chicago in 1921, was awarded a doctorate in physical chemistry there in 1929. He has been with United States Pipe & Foundry Co., Burlington, N. J., since 1938. Dr. Schuh served during the war on the War Metallurgy Committee, Office of Scientific Research & Development, and was cited by both the Army Ordnance Department and the War and Navy Departments. He is chairman of the AFS Cupola Advisory Committee.

THOMAS E. BARLOW

HORACE A. DEANE

VINCENT DELPORT

SERVICE CITATION

THOMAS E. BARLOW has been cited "for unstinting service to the society and its chapters as a speaker on molding sands and cupola operations and for his ready willingness to serve whenever called upon." Mr. Barlow joined Eastern Clay Products as sales manager in 1947. Previously he was with the Gray Iron Research Institute, Vanadium Corp. of America, Battelle Memorial Institute and the Ecorse Foundry, Detroit. He is a graduate of the University of Michigan.

HORACE A. DEANE has been cited "for conscientious service to the society and the castings industry, especially in the encouragement of young men toward foundry work." Mr. Deane, a graduate of the University of Illinois, has been associated with Deere & Co., Moline, Ill., American Brake Shoe Co., New York, and, since 1952, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. He is a past chairman of the Quad City and Metropolitan Chapters of AFS and was a national director in 1946-49.

VINCENT DELPORT has been cited "for distinguished service to the society as its European representative, especially in connection with the International Foundry Congresses." Mr. Delport, treasurer of Penton Publishing Co. Ltd., London, and European editor of FOUNDRY, joined the Penton organization as a correspondent in 1922. Since 1926 he has been European delegate of the AFS to the International Committee of Foundry Technical Associations, of which he was president in 1937. In 1956 he was named honorary treasurer.

FRANK W. SHIPLEY

LIFE MEMBERSHIP

FRANK W. SHIPLEY is to be awarded an honorary life membership in the AFS as retiring president of the society. Mr. Shipley, for the past 13 years foundry manager, Caterpillar Tractor Co., Peoria, Ill., has been with that organization since 1929. He was graduated from Purdue University in 1921. He entered the foundry industry with Studebaker Corp., South Bend, Ind., later serving with Lakey Foundry & Machine Co., Muskegon, Mich., and Fairbanks, Morse & Co., Beloit, Wis. Mr. Shipley is a past chairman of the Central Illinois Chapter of AFS and has served as a national director, and as a member of various committees of the Educational Division.

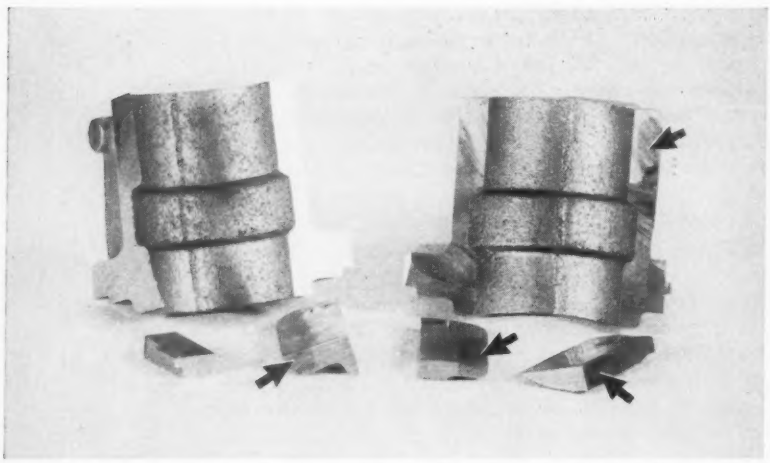
Questions and Answers

Difficulty with tool breakage in machining of manganese bronze caused by free iron . . . Tellurium core or mold wash will chill areas . . . Fan installation alone may not solve problem . . . Finding modulus of elasticity . . . Hard surface causes trouble

Free Iron Breaks the Tools

QUESTION Recently in machining some of our manganese bronze castings we ran into considerable difficulty in that the tools broke off. Examination of the machined surface showed whitish appearing spots. On sectioning part of the casting we found some fairly large spots of this material and those appear as dark areas in the accompanying photograph. Can you tell us what the material is and its source? Ingot metal was used.

ANSWER The hard material in your manganese bronze is iron which was not completely dissolved to form a solid solution with the other constituents. Possibly the trouble arose in the manufacture of the ingot although foundry use of contaminated borings, etc. which were not subjected to magnetic separation could be a source. In the manufacture of manganese bronze ingot the iron addition usually is made through incorporation of low carbon steel clippings or turnings in the charge, and occasionally the iron is not entirely dissolved. Solution of the iron requires careful and thorough rabbling or stirring of the molten bath to provide intimate contact between the iron and copper as well as to create a uniform temperature between top and bottom of the molten metal in the furnace. If the operation is not performed properly some of the iron remains in solid form and finds its way into the ingot—and then into the mold and castings.



Arrows indicate locations of hard inclusions causing tool breakage

Wants To Chill Casting Areas

QUESTION While we are familiar with the use of tellurium as a ladle addition to cast iron, we have some of that element in powder form, and would like to experiment in hardening or chilling specific areas of castings by brushing tellurium on the mold at such points. Can you suggest a suitable wash or paint that would incorporate the tellurium?

ANSWER Some years ago, Crout in the November, 1944, issue of FOUNDRY described the application of a tellurium wash or coating to molds and cores to chill or densify specific areas of gray iron castings. A little later, Vadeboncoeur in *Transactions*, American Society for Metals, 1945, gave information on its use in eliminating shrinky sections in diesel and automotive cylinder blocks and liners. In the July, 1949, FOUNDRY, Austin also discussed the problem.

According to Vadeboncoeur, the base material was a tellurium paste containing 20 per cent Te, 20 per cent water and the remainder probably bentonite. The paste caused difficulties, however, and it was diluted with plumbago wash. From the information given, it appears that a wash composed of 2 grams Te, 11 grams bentonite, 5 grams silica flour and 82 grams water should serve. Dry materials are mixed thoroughly before adding the water. The paste formed is mixed with 400 cc plumbago wash with a specific gravity of 27° Be. Wash must be stirred thoroughly each time before use.

Two washes are mentioned by Austin. One is composed of 32 per cent Te, 60 per cent silica, 6 per cent alumina and 2 per cent iron oxide. One pound is shaken well in 4 qt water and then plumbago is added and shaken until a density of 27° Be is reached. Before use ¼ pint of core gum mixed with hot water to the consistency of molasses is added. The other mixture is composed of 50 grams Te, 200 grams silica smoke and ½ pint commercial alcohol.

Has Problem in Ventilation

QUESTION We are looking for fans which can be installed in several 21-in.-diam stacks located over our iron-pot melting units. The stacks do not draw, apparently due to excessive exhaust of air in other parts of the shop.

ANSWER It is suggested that before going ahead with the purchase of a fan that it might be advisable to secure the services of a ventilation expert to make the proper recommendations. As you know, when air is exhausted from a structure it has to be replaced by outside air. In ordinary cases this is accomplished through usual leakage around and through openings such as doors and windows. With high exhaust rates that is not sufficient; additional openings have to be provided, and in your case the stacks apparently perform that function.

Possibly the stacks do not operate because they are too far away from the source to be exhausted. For example, if the stack openings are at the roof, they only tend to exhaust the upper area even under favorable conditions. We do not know your conditions, but perhaps if the stacks were extended down and at-

tached to suitable hooding a few feet above the furnace tops they might function better. But here again, that might not solve the problem because of high exhaust rates in adjoining areas, and even installation of a fan or fans in the stacks might not help unless the capacity is sufficient to overcome that in the immediate area.

Perhaps the best solution of your problem is the establishment of an air curtain around the furnace area. This employs a blower on the roof with ductwork having adjustable slotted openings to direct the flow of outside air downward at the proper angle to a suitable distance above the floor level. Fans are used in the stacks, and by adjustment between incoming and outgoing air, the shop atmosphere outside the curtained area is not disturbed. Probably the same system could be applied to other areas being exhausted.

Modulus of Elasticity Value

QUESTION If we have information on the tensile strength and transverse load values of gray iron can we determine the modulus of elasticity value for that iron?

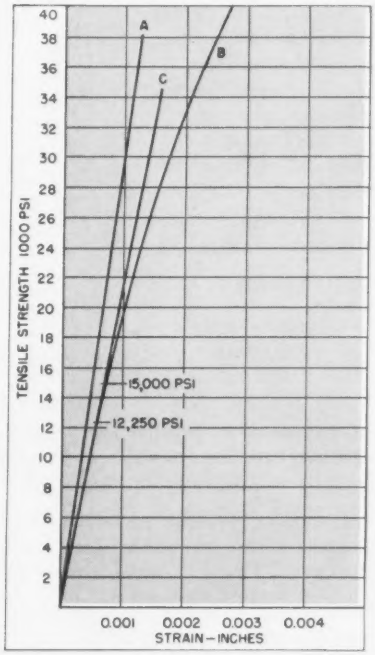
ANSWER The true modulus of elasticity of a material must follow Hooke's law, which states that *stress is proportional to strain.* Gray iron conforms to that condition to only a limited degree, as shown in the accompanying illustration where curve *A* represents adherence to the law while curve *B* represents a gray iron with a tensile strength of 49,000 psi as obtained in the usual stress-strain diagram. Through an involved procedure of applying repeated loadings at the same stress to determine an established curve of recoverable strain, a steeper curve for the iron could be established which would conform to Hooke's law to a greater extent.

Hence, the usual practice is to express the modulus of elasticity as a tangent modulus taken from the slope of the tangent to the stress-strain curve taken from the origin. This is indicated by curve *C*. The point of contact is about 15,000 psi, as indicated, which gives a modulus of 21,420,000 psi. Another method, termed "effective modulus of elasticity," is based on a given percentage of the tensile strength, usually 25 per cent, or in this case 12,250 psi. Strain is about 0.00058-in. which would give a modulus of 21,120,000 psi.

Still another method is termed "relative modulus of elasticity as determined in transverse," which uses the equation:

$$E = P L^3 / 48 I D$$

where E equals the modulus of elasticity in transverse; P is the load in lb; L is the span in in.; I is the moment of inertia, and D is the deflection (at load P) in in.



Stress-strain diagram of a gray iron, including other illustrative curves

Since the expression $L^3/48$ I for a 1.2-in.-diam bar is equal to 1194 the equation is simplified to:

$$E = 1194 P/D$$

Therefore, a 1.2-in. bar breaking on the transverse test at a 2800-lb load with a deflection at that point of 0.18-in. would show a modulus of 18,600,000 psi. Indications are that the modulus in transverse is about 0.88 to 0.9 times the modulus in tension for unalloyed irons and 0.99 to 1.01 times the modulus in tension for alloyed irons. Also it should be pointed out that in these tests the bar diameter should be measured accurately and variations from the 1.2-in. standard corrected by application of factors presented in ASTM standard specification A48-48.

Surface on Casting Is Hard

QUESTION In our foundry in Israel we are producing gray iron cylinder liners by the centrifugal process. The iron is melted in an induction furnace of 150 kg capacity and shows a composition of 3.3 to 3.4 per cent TC, 0.70 per cent Mn, 2.6 to 2.7 per cent Si, 0.2 per cent Cr, and less than 0.10 per cent S and P. Mold is coated with a heat resisting wash. Our difficulty with the liners is that the outside skin to a depth of 1 to 2 mm (0.04-0.08-in.) chills to a white fracture, causing considerable trouble in our work. It also necessitates heat treatment of the sleeve, adding much work and impairing the brinell hardness by decreasing it from 220-240 Bhn to 160 which is undesirable. Can you suggest any means to eliminate this hard skin or layer on the surface?

ANSWER Consideration of your problem with chilling of the outer skin of the liners brings to mind a number of possibilities to overcome that condition. Leaving for the moment the obvious one of changing composition, it is possible that a reduction in pouring temperature might be an answer, and we suggest you look into that phase, although we do not believe you should go below 2600°F (1426°C). It may be that the coating you are applying to the metal molds is not thick enough or lacks insulating characteristics. Another factor to be considered is the time the castings remain in the molds. It might be well worth while to try removing the castings at a relatively high temperature, say between 1600 to 1800°F (870 to 980°C), and allow them to cool in the air.

In addition to those suggestions is the matter of change in composition or perhaps before going to that step, the addition of some inoculating agent to the molten metal. Inoculating agent, of course, should be a graphitizing type. One procedure might be to reduce the silicon entering in the charge, and add it in the form of ground ferrosilicon to the ladle. Reduction should not be over 0.5 per cent—that is in your case, the charge silicon may be 2.1 to 2.2 per cent with 0.5 per cent silicon in the ladle. Perhaps the desired result might be obtained by just adding 0.1 or 0.2 per cent silicon to the ladle without a change in the charge. Other possibilities are addition of coarse graphite and proprietary graphitizing inoculants.

As far as composition change is

concerned, there are two approaches. One would be to add some agent to modify the strong carbide stabilizing effect of the chromium, such as nickel or copper. Indications are that 2½ parts of nickel will counterbalance the effect of 1 part of chromium, and you could start with an addition of 0.5 per cent nickel and then reduce to the least amount that is effective, or begin with a small amount and increase. Since copper has somewhat the same effect as nickel, that could be tried. Another possibility is to reduce the chromium or leave it out, and make adjustment in the silicon content of the iron as a counterbalance. Basis would be that 1 part chromium offsets the graphitizing effect of 1½ parts silicon.

Resin-bonded Impeller Core

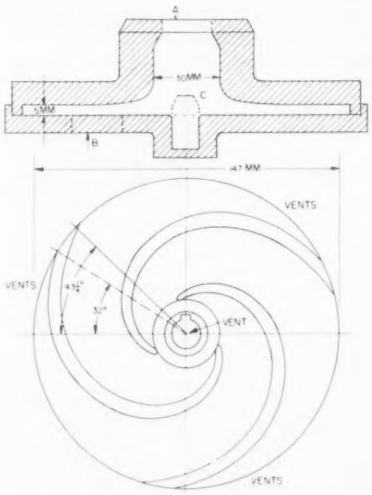
QUESTION We have been attempting without success to make shell cores for the impellers used in our centrifugal pumps. We have used the drawing for the impeller to indicate the corebox, which is made in two parts, and have tried to invest the core by a combination of the dump method and partial blowing. You will see from the drawing that the cores are 5 mm (0.20-in.) thick at the outer edge. When we invest either at the hub, point A, or through three 1-in.-diam holes equidistantly spaced, points B, we do not fill the corebox completely. Corebox is at a temperature of 300°C (570°F) and cores are cured in an oven at 350 to 375°C (660 to 710°F). As we require nearly 500 impellers of various types similar to that shown, which must have cores to provide as smooth a surface as possible on the interior, we would like to make them by the shell process.

ANSWER Your mention of using a combination of the dump method and partial blowing indicates that you are using a dry sand-dry resin mixture which hardly can be expected to fill a closed corebox of the type mentioned—a fact you already have discovered through practical experience. We believe the only way to produce the impeller core is by blowing a resin-coated sand. Suitable venting must be located at the periphery, and the arrangement will have to be developed experimentally. It is suggested that for the first attempt the vents be located at the extreme tips of the vanes, as indicated on the sketch. If those are not sufficient to provide proper filling, then others can be added where needed.

In blowing it appears that it would be satisfactory to use the hub for the entrance of the air-sand mix. There is a possibility, however, that some difficulty may be encountered in getting the sand to follow the curved passages. Hence, if the central entrance does not function, then you will have to try your second scheme of using three holes on the opposite half of the corebox. In that case the corebox half should be changed to provide a flat surface, as indicated at area C, by removing the outwardly projecting portion and substituting a small boss extending into the cavity. This forms a cavity in the core into which a separately made pin or cylindrical core is cemented to form the desired print at that point.

If you do not have any resin-coated sand, you can make some by the cold-coating method at room temperature. Your dry resin will serve and the amount used per 100 lb sand will depend upon the sand. With round-grain sand, about 2.5 lb is employed, while with sub angular-grain sand 4 lb is required. Sand and resin are mixed dry in a muller type machine for 1 to 2 minutes to get the resin distributed, and then a solvent of alcohol (denatured ethyl or isopropyl) and water is added. Alcohol-water solution is composed of 3 parts alcohol to 1 part water by weight. Quantity of solvent varies with the resin; for the 2.5-lb resin content 0.72 lb solvent is used and with the 4-lb resin content 1 lb solvent is employed.

The solvent is added slowly to the resin-sand mix in the muller, and mulling is continued for 10 to 20 minutes until the solvent has evaporated and the coated sand is dry. That can be determined by appearance, and checked by picking up a handful. It should show no strength. Mulling or mixing should be stopped as soon as the sand is dry.



Curved vanes in impeller may cause difficulty in the core's production

Casting with Abrasive Face

QUESTION We are in need of technical advice on a specific problem. A number of aluminum castings have to be produced in which certain areas must have an abrasive non-slip surface. Can you refer us to a method of accomplishing this?

ANSWER Obtaining an integral abrasive coating on a casting surface requires some practice and experience. Essentially it involves coating the mold surface with some type of adhesive, screening the abrasive on the sticky surface, and then drying and pouring. Many types of adhesives have been employed. They include thin clay wash, molasses water, sulphite pitch or lignin solution, bentonite wash with or without a small amount of sodium silicate, sodium silicate solution, and thin resin solution.

The adhesive preferably is sprayed on the mold surface to obtain a thin, uniform coating, and then the abrasive grain, ranging in size from 12 to 36-mesh, is distributed carefully over the surface by sifting through a screen or sieve of the same mesh size as the abrasive. The layer should be thin and uniform.

After the abrasive is in place, the mold is skin dried to drive off the excess moisture so that the molten metal will lie quietly against the surface.

Coloring of Brass and Bronze

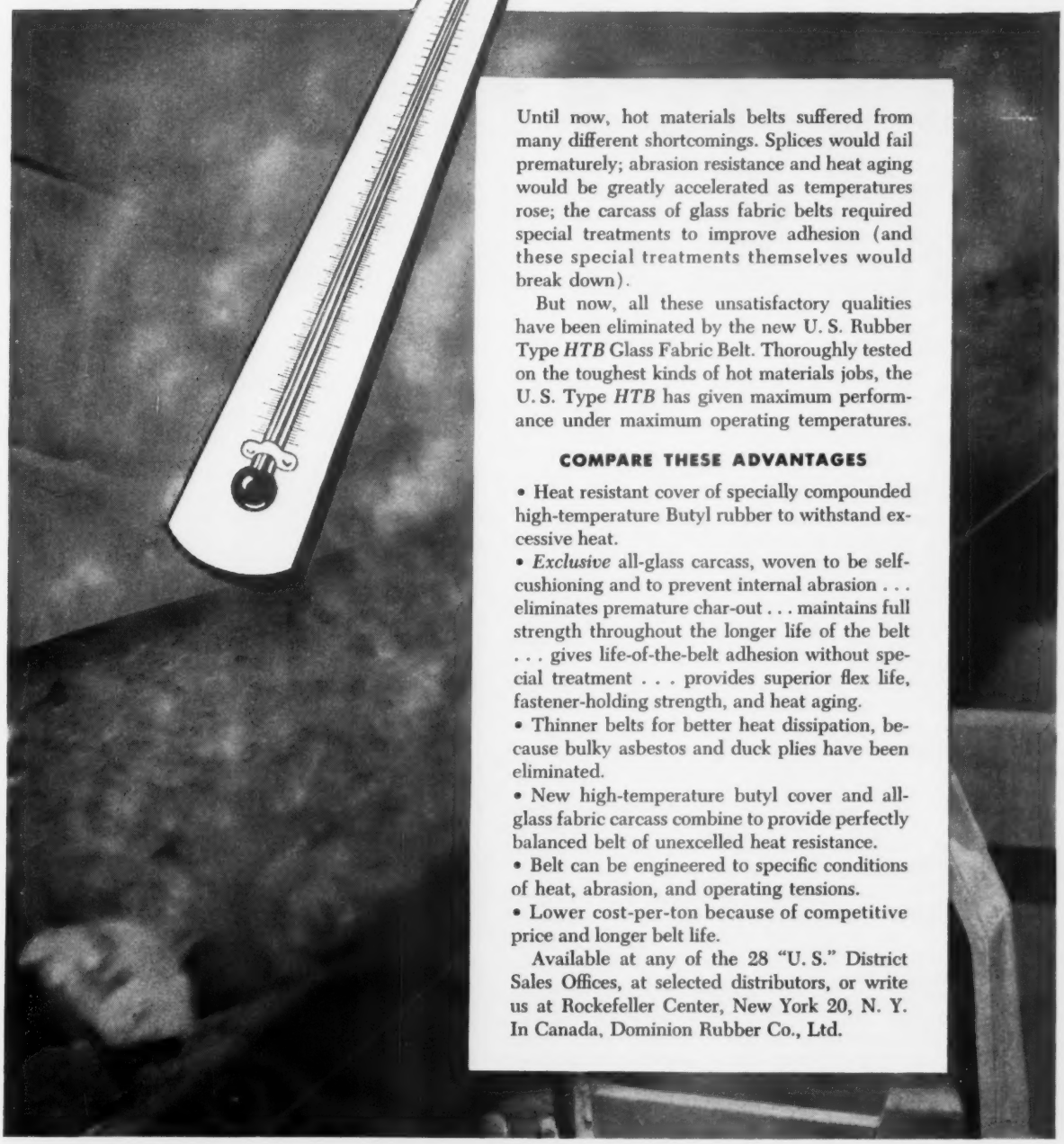
QUESTION Will you supply us with information on the best method of obtaining a green patina on brass and bronze?

ANSWER Since there are several kinds of green coatings or patinas applied to brass and bronze castings, you will have to try them and determine for yourself which is best. One commonly used is termed verde antique, and the color may be developed with either of two soluttions. One solution is composed of 4 oz each of copper nitrate, ammonium chloride and calcium chloride dissolved in 1 gallon of water. The other contains ½ gallon of acetic acid, 20 oz of ammonium chloride, and 7 oz each of sodium chloride, cream of tartar and copper acetate in ½ gallon of water. Solutions are stippled on the work until desired color is obtained.

A color known as tiffany green is obtained with a solution composed of 8 oz copper sulphate, 4 oz ammonium chloride, 4 oz sodium chloride, 1 oz zinc chloride and 2 oz acetic acid in 1 gallon of water. Procedure is to immerse the casting, withdraw and allow to dry. Repeat as desired.

CONVEYOR BELTS

Turn on the Heat this Belt can take it!



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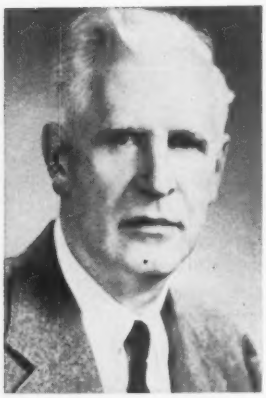

● GUSTAF R. YOUNG
. . . director, mfg. operations

● OGDEN W. SUTRO
. . . director of sales

● LESLIE E. ALEXANDER
. . . Minneapolis Electric supt.

● CARTER DE LAITTRE
. . . becomes works manager

GUSTAF R. YOUNG, since 1954 general superintendent, Malleable Iron Fittings Co., Branford, Conn., has been named director of manufacturing operations. He joined the company in 1940 as production manager, and became a director in 1955. Previously he was vice president, Empire Steel Castings Inc., Reading, Pa. His earlier connections include Reading Iron Co., Reading, Pa., and U. S. Rubber Co., Williamsport, Pa., and Naugatuck, Conn. **Ogden W. Sutro,** formerly assistant to the president on sales matters, was named director of sales and marketing for Malleable Iron Fittings. With the company since 1948, he was sales manager of the Pole Line Hardware Division from 1949 to 1954 and became a director in 1956.

Edwin H. Walker was elected president-general manager, General Motors of Canada Ltd., Oshawa, Ont., succeeding **William A. Wecker** who has retired after 21 years of service, nearly 12 years as head of GM of Canada. **E. Jack Barbeau** was named president-general manager of McKinnon Industries Ltd., St. Catherines, Ont., the position held by Mr. Walker since 1953. Mr. Barbeau has been at McKinnon's Grantham Township, Ontario plant since 1954, recently as factory manager there.

Hal O. Gummere, formerly vice president-general manager, Buckeye Tools Corp., Dayton, O., was elected executive vice president. **Ernest B. Meynard,** recently general sales manager, was named vice president-sales.

Karl T. Rinderle recently joined Farrell-Cheek Steel Co., Sandusky, O. He received his engineering training at Carnegie Institute of Technology and was associated with Brown Industries Inc., Sandusky, where he was works manager, foundry superintendent, vice president and plant manager. He joined Westover Corp., Milwaukee, last year and was assigned to the Stainless Steel & Alloy Division, Shawinigan Chemicals Ltd., Shawinigan Falls, Quebec, Canada. **James M. Ritter** was named sales manager, and **Eugene E. Stookey,** assistant manager of sales for Farrell-Cheek Steel. Both have been with the company more than 10 years.

Richard E. Whinrey, a vice president of Link-Belt Co. and general manager of its Ewart plant, Indianapolis, was elected a director of the company. **John A. Metz Jr.,** of the Pittsburgh law firm of Metz, McClure & McAlister, also was named a director.

Frank L. Feltes was elected president and chairman, Allyne-Ryan Foundry Co., Cleveland. **Gabriel R. Friedl** was named secretary-treasurer, and **Neath W. Wilson,** assistant secretary.

Roger J. Metzler was named operations manager, WaiMet Alloys Co., Detroit, where he will be responsible for metallurgy, sales and production of master alloys for the investment casting industry. He joined the company last year as sales manager.

● **Carter De Laittre,** since 1946 superintendent, Minneapolis Electric Steel Castings Co., Minneapolis, was appointed works manager. He was graduated from University of Minnesota and has been with Minneapolis Electric since 1942. **Leslie E. Alexander** has succeeded Mr. De Laittre as superintendent. He was formerly plant engineer.

John A. Dugan was named manager of the shell molding division and customer service, West Steel Casting Co., Cleveland. Mr. Dugan joined the company 15 years ago, and until recently was manager of production control. **Bruce Aiken,** formerly with Crucible Steel Casting Co., Cleveland, succeeds Mr. Dugan as manager of production control.

Andrew A. Kucher, director of Ford Motor Co.'s scientific laboratory, Dearborn, Mich., was appointed director of the engineering staff. In the absence of **Earle S. MacPherson,** vice president-engineering, who is ill, Mr. Kucher will supervise activities of the central engineering staff. He became director of the scientific laboratory when it was opened in 1951.

Harry J. Camillery was elected vice president, Fairview Foundry Inc., Poughkeepsie, N. Y.

Ernest G. de Coriolis, director of research and development, Surface Combustion Corp., Toledo, O., was named "Engineer of the Year for 1957" by the Toledo Technical Council, at the sixth annual Engineers'

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Circle 651 on Inquiry Card—Page 51

MEN OF INDUSTRY

● JACKSON KRALL
. . . becomes sales mgr.

● H. S. CONNOR
. . . G. H. R. malleable sales

● R. G. FISHER
. . . G. H. R. sales manager

● CHARLES F. MENZER
. . . Alloy Steel works mgr.

Week Banquet, Feb. 21. A graduate of University of Toronto, Mr. de Coriolis has been associated with Surface Combustion over 30 years.

● **Jackson Krall** was appointed sales manager, Milwaukee Malleable & Gray Iron Works Inc., Milwaukee. For the last 7 years he was the company's representative in Michigan and Ohio, with headquarters in Detroit.

Charles H. Schwerin has resigned as manager, Industrial Furnace Division, Gas Machinery Co., Cleveland, but will continue with that organization as a consultant.

● **Roy E. Ferree** was named president, Treesdale Laboratories, Mars, Pa., Textile Processing Co., and its subsidiary Pittsburgh Metals Purifying Co., Pittsburgh. **John R. Loutzenhiser** was elected chairman of the board, **Alexander L. Suto** and **Joseph Schuchert Jr.**, vice presidents, and **C. E. Thompson** was re-elected secretary-treasurer.

● **R. G. Fisher** was named sales manager, G. H. R. Foundry Division, producer of gray iron castings, Dayton Malleable Iron Co., Dayton, O. Formerly assistant general sales manager, he has been associated with Dayton Malleable for 23 years. **H. S. Connor** was appointed sales manager of malleable iron castings produced at the company's Ironton Division, Ironton, O., and Ohio Division, Columbus, O., where he will be located. Mr. Connor previously was sales manager, Arcade Malleable Iron Co., Worcester, Mass.

● **William Cribbs** was named sales development engineer, and **Thomas Reeves**, liaison sales engineer, Misco Precision Casting Co., Whitehall, Mich. Mr. Cribbs was graduated from Michigan State University. Prior to joining Misco last year he was an engineer in the Chicago office, Manning, Maxwell & Moore Corp., Muskegon, Mich. Mr. Reeves, also a Michigan State graduate, until he joined Misco recently, was chief development engineer, Continental Motors Corp., Automotive Division, Muskegon.

● **Charles F. Menzer** was named works manager, Alloy Steel Casting Co., Southampton, Pa. A graduate of Stevens Institute of Technology, Mr. Menzer recently was chief quality control engineer, Cooper Alloy Co., Hillside, N. J.

B. C. Yearley, assistant to the operating vice president, National Malleable & Steel Castings Co., Cleveland, has been appointed a trustee of the American Foundrymen's Society's Training and Research Institute, Chicago. A graduate of Case Institute of Technology, he joined National Malleable in 1923. Mr. Yearley is a member of the Malleable Division Advisory Group of the AFS and chairman of its roundtable subcommittee.

● **Edward A. Kooper** has been named development engineer, Gray Iron Research Institute, Columbus, O. A

● ROY E. FERREE
. . . heads Treesdale firm

● WILLIAM CRIBBS
. . . Misco sales development

● THOMAS REEVES
. . . liaison sales, Misco

● EDWARD A. KOOPER
. . . development engineer

Castings production up... *from* 18 *to* 128

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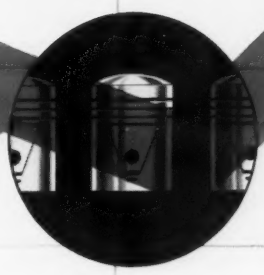

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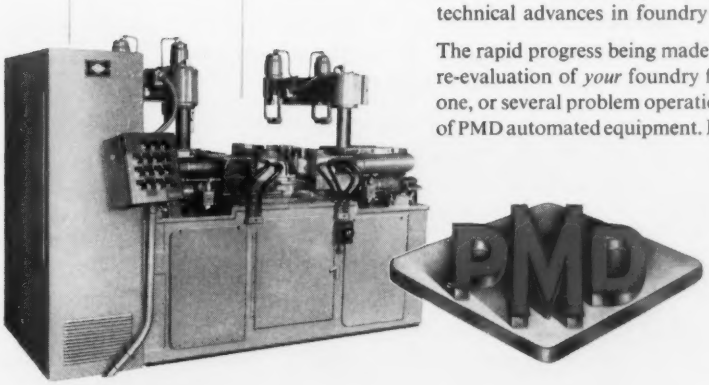

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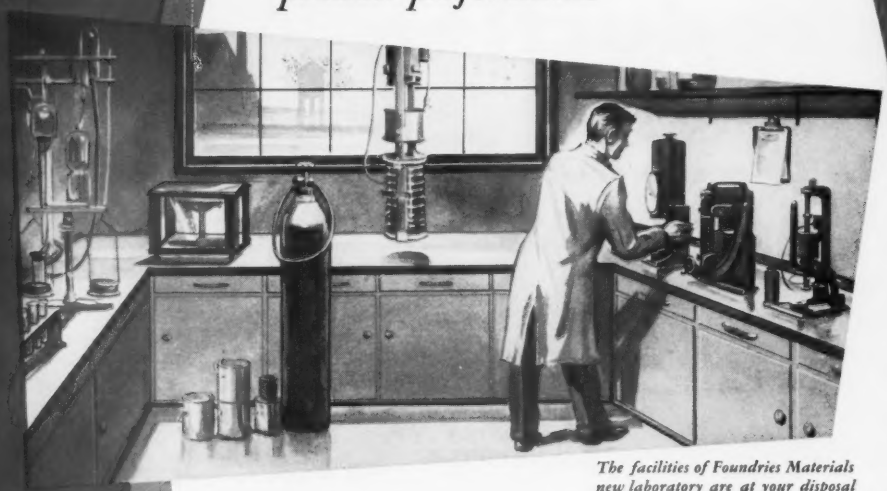

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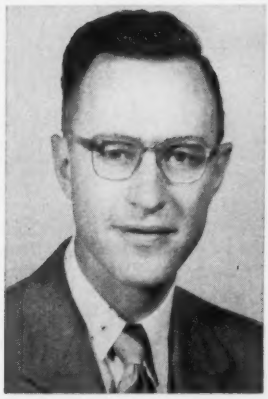

● JOHN G. FRISCHKORN
. . . assistant sales mgr.

● NORMAN R. EKHOLM
. . . Atlanta mgr., Norton

● JOHN R. H. TRUELSEN
. . . Indianapolis mgr., Norton

● R. W. RUDDLE
. . . technical director

graduate of Newark College of Engineering, he was formerly foundry engineer, American Radiator & Standard Sanitary Corp., Bayonne, N. J.

● **John G. Frischkorn** was named assistant sales manager, Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O. For the past year he was district sales manager for the company in West Virginia, Pennsylvania, New York and eastern Canada. Mr. Frischkorn has had 16 years' experience with the company as design engineer for overhead materials handling equipment. Previously he was associated with Euclid Crane & Hoist Co., Cleveland, where for 5 years he was in engineering and sales.

John C. Wallace has been named vice president-engineering, the Walworth Co., New York. He was formerly vice president-general manager, Hunt-Spiller Mfg. Corp., Boston. **Frederick M. Jackson,** since 1952 vice president for the company's oil and gas industry sales, was appointed vice president-sales. He joined the company in 1926. **George E. McDonald** was made a company vice president, and will continue as treasurer, a position he has held since 1953. He has been with Walworth since 1925.

Sheldon H. Ingram was appointed Pittsburgh branch manager, the Fairbanks Co., New York, to cover sales of casters, hand trucks, wheels, etc. in western Pennsylvania, Ohio, West Virginia and northern Kentucky.

Sam Burkhalter recently joined Lindberg Industrial Corp., Chicago, as application engineer for field-erected furnace installations.

● **Norman R. Ekholm** and **John R. H. Truelsen** were appointed district managers in new offices recently established by Norton Co., Worcester, Mass. Mr. Ekholm, who joined the company in 1935, will be located in Atlanta. Since 1946 he has been an abrasive engineer for the company on the West Coast. Mr. Truelsen, who was formerly assigned to the northern Illinois area, was named manager in Indianapolis. He has been with Norton since 1947.

Roger F. Waindle, president, Wai-Met Alloys Co., Detroit, was recently named a member of the National Defense Executive Reserve Unit, Business and Defense Services Administration, Department of Commerce, Washington, created by the government as a vital part of the nation's industrial readiness program during peacetime.

Ben J. Roth, formerly in the Erie, Pa., sales office, Pickands Mather & Co., Cleveland, has been appointed district sales manager of pig iron, ferroalloys, and coke in the Washington office. **John A. Krum,** who was in the Cleveland sales office, was named district sales manager in Cincinnati.

Aubrey Bukowski recently joined the Castings Section, Metallurgy Division, Naval Research Laboratory, Washington. He has been associated with Wehr Steel Co., Milwaukee, since graduation from University of Wisconsin in 1955.

Thomas F. Gallagher was appointed Chicago district sales manager, Laclede-Christy Division, H. K. Porter Co., St. Louis. A sales engineer for the company since 1946, he was previously in Buffalo.

● **R. W. Ruddle** recently joined Foundry Services Inc., Columbus, O., where he will be in charge of technical service, research and development in the company's laboratories. Educated in England, he received a master's degree from Cambridge University. For the last 10 years Mr. Ruddle was head of the melting and casting section of the British Nonferrous Metals Research Association, London, and recently was with Foundry Services Ltd., Birmingham, England, for a short period.

J. G. Johns, formerly assistant manager in the Philadelphia office, Industrial Chemicals Division, Olin Mathieson Chemical Corp., New York, has succeeded **W. D. Marshall** as district manager of the division there. Mr. Marshall, with the company 37 years, has been assigned to sales duties of a special nature. **Victor C. Fusco** and **Don Threlkeld** have been transferred to Pittsburgh and Chicago, respectively.

R. W. Wilson, since 1954 sales engineer, Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York, was appointed Chicago district manager. **F. W. Hanson** was named district manager in Houston, Tex. He was a sales and metallurgical service engineer with Electromet since 1939.

William G. Messinger, secretary and a director, Chain Belt Co., Milwaukee, was recently named a director of Sivyer Steel Casting Co., there.

Lloyd Slater has been appointed executive director of the Foundation for Instrumentation Education and Research, New York, founded last year by Instrument Society of America, Pittsburgh. The foundation will

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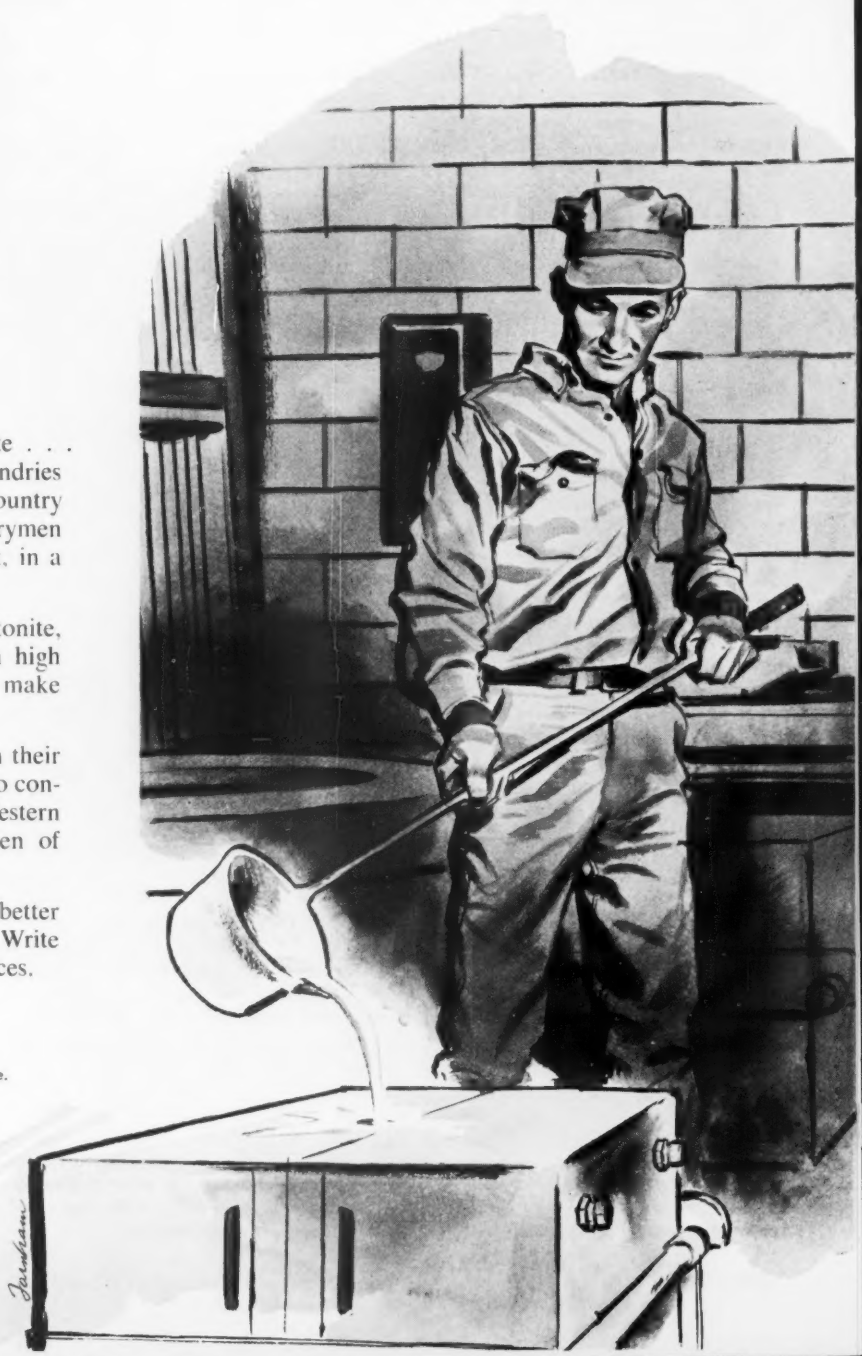

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Circle 654 on Inquiry Card—Page 51

5722

survey needs for technical manpower in the instrumentation-automation field. Mr. Slater recently was managing editor of *Control Engineering*.

Wayne Conway was appointed eastern division sales manager, American Monorail Co., with headquarters at the company's main office in Cleveland. **Allen Reinart,** formerly assistant district manager in Philadelphia, has succeeded Mr. Conway as district manager there. **Gori Pietropolo** was named assistant district manager in Philadelphia.

Robert J. Kiefer was named Chicago sales representative, Laclede-Christy Division, H. K. Porter Co., St. Louis. In production and sales with Laclede-Christy since 1941, he was formerly district works manager of fire brick production and superintendent of the Laclede works, St. Louis.

Michael M. Gruich was appointed district manager, and **Howard W. Hartrick,** sales engineer, in northern Ohio, Jervis B. Webb Co., Detroit, with headquarters at Cleveland. Mr. Gruich was formerly vice president, Michigan Crane & Conveyor Co., Detroit. Mr. Hartrick has worked in the conveyor industry for 18 years.

Raymond E. Burton, since 1955 assistant sales manager, Koehring Division, Koehring Co., Milwaukee, was appointed assistant director of marketing for Koehring Co., to cover market research and analysis. Mr. Burton has been with the Koehring organization since 1948.

Richard L. Horn was named field test engineer for the Michigan area, Grinding Wheel Division, Electro Refractories & Abrasives Corp., Buffalo, with headquarters in Saginaw. He was formerly an engineer with the Saginaw Steering Gear Division of General Motors.

George C. McCormick was elected president, Industrial Heating Equipment Co., Detroit, succeeding **Charles E. Buysse,** who was made board chairman. **Clifton E. Wenger** was named vice president-secretary, and **Eugene K. Buysse,** treasurer.

Stephen Smith, since 1951 supervisor of the sales department, Norton Co., Worcester, Mass., has been appointed manager of the sales service department. He joined the company in 1946.

Peter J. May was recently appointed manager of foundry sales, Cleveland Quarries Co., Amherst, O.

● ALBERT W. GRUER JR.
. . . joins Carondelet Foundry

● MILO L. PHILLIPS
. . . new sales manager

● **Albert W. Gruer Jr.** was named manager of sales and marketing, Carondelet Foundry Co., St. Louis. Until recently he was director of marketing research, Cessna Aircraft Co., Wichita, Kans.

Fred H. Zuck, president and chairman of the executive committee, Sandusky Foundry & Machine Co., Sandusky, O., has resigned as president of the Peoples Savings Association there after 21 years of service as its managing officer. Mr. Zuck plans to devote full time to management of Sandusky Foundry.

O. Martin Peterson, formerly associated with Borg-Warner Corp., St. Louis, was appointed sales representative in the New York office, Lithium Corp. of America, Minneapolis. His territory will include Ohio, Michigan, Indiana, Kentucky and Tennessee.

George H. Wilson was appointed northwestern representative, E. S. Gilmore Co., Los Angeles. With headquarters in Tacoma, Wash., he will handle sales and service of carbon and graphite products for the Crescent Carbon Corp.'s new plant in Rosamond, Calif.

Bernard J. Alperin was appointed development engineer, Applied Research and Development Laboratory, Foundry Department, General Electric Co., Schenectady, N. Y. A graduate of Massachusetts Institute of Technology, he joined the company's Erie Foundries, Erie, Pa., as a nonferrous metallurgist in the foundry department.

H. B. Parfet Jr. was appointed a sales engineer in the Chicago office, Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York.

● **Milo L. Phillips** has been appointed sales manager, Alloys & Chemicals Mfg. Co., Cleveland. A graduate of University of Minnesota, for 10 years he was associated with Aluminum Co. of America, Pittsburgh, in production and sales, and later was a sales supervisor and foundry consultant, William F. Jobbins Co., Aurora, Ill. He joined Alloys & Chemicals last year.

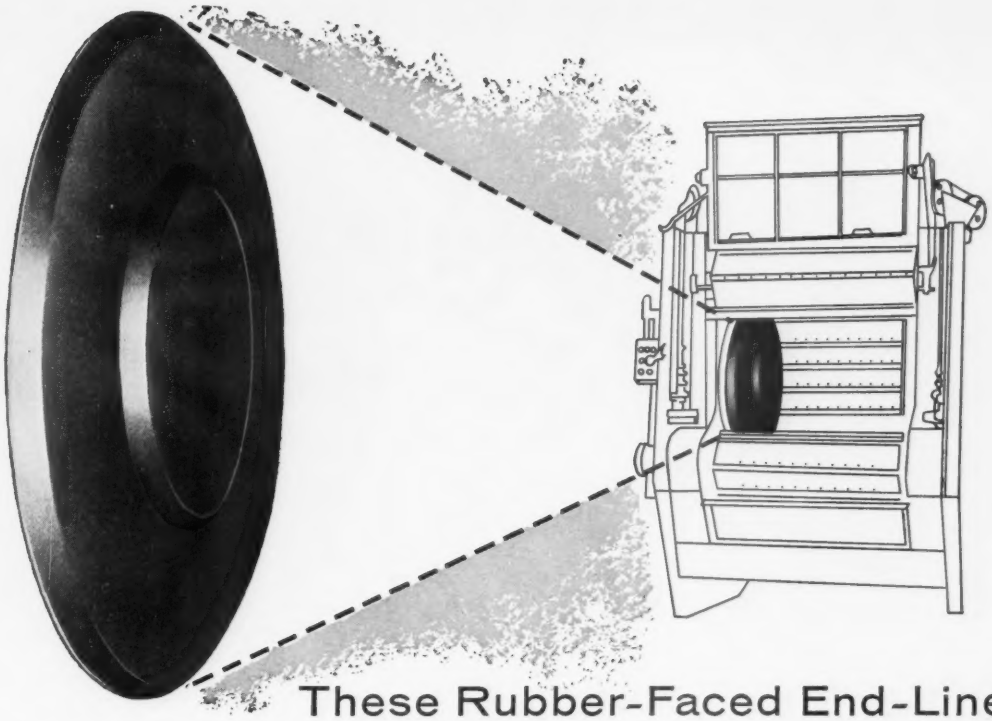
Thomas R. Morrison was appointed direct factory representative in Delaware, Maryland and central Pennsylvania, Columbus-McKinnon Chain Corp., and its Chisholm-Moore Hoist Division, Tonawanda, N. Y. **Arthur H. Luchs** was made direct factory representative in northern California and Nevada, with headquarters in San Francisco, for the company's chain products.

O. S. Haskell, formerly sales manager, General Electric Furnace & Oven Division, Schenectady, N. Y., recently joined Lindberg Engineering Co., and Lindberg Industrial Corp., Chicago, as East Coast field representative, with headquarters in Greenwich, Conn.

Raymond W. Naus has been appointed sales manager, Pressco Casting & Mfg. Corp., Chesterton, Ind. **Ben Pethe** was named chief draftsman under the vice president of engineering.

Grayson K. Bailey was appointed sales engineer in Illinois, Indiana, Wisconsin and western Michigan, American Fire Clay & Products Co., Canfield, O.

Joseph A. Gable recently joined National Crucible Co., Philadelphia, as sales representative in the Detroit area and Ohio.



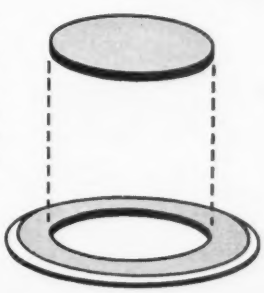
These Rubber-Faced End-Liners with replaceable centers

cut shot breakage up to 50%

...last far longer

Hollow Center Disc with Patch Plate

Center disc is recessed flush in hollow center of main disc. Center can be replaced without replacing entire end-liner.



Solid Disc with Center Patch

Both discs easily bolted to main structure of shot blast machine.

With Gates Rubber-Faced End-Liners (Shot Blast Discs) installed, the cost of operating shot blast machines is considerably reduced. Gates Rubber-Faced End-Liners cut shot breakage in *half*, affording savings up to 50% in shot replacement costs.

Because the centers of these end-liners are replaceable, the life of main discs is increased greatly.

Available in two types — a hollow center disc with flush-mounted patch plate and a solid disc with center patch.

Contact any of the Gates authorized distributors listed below for complete information on sizes and prices — or write direct to The Gates Rubber Company Sales Division, Inc., Denver, Colorado.

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8200 Vincennes St., Chicago, Ill.

Owen-Richards Co., Inc.
824 - 31st St., No., Birmingham, Ala.

Wiley Hughes Supply Co.
New York Ave. & Spruce St., Trenton, N.J.

Baker Warren
80 - 26th St., Pittsburgh, Pa.

Rubber Faced Steel Plate, Inc.
28400 Grand River, Farmington, Mich.

Western Rubber Products Co.
320 So. Grand Ave., St. Louis, Mo.

TPA165

Gates

Gates Rubber-Faced Shot Blast Discs

The annual alumni dinner of the FEF was held on the evening of March 12

FEF CONFERENCE

Discusses Recruiting and Training

By FRANK G. STEINEBACH
Editor
and
JACK C. MISKE
Associate Editor

THE tenth annual College-Industry Conference of the Foundry Educational Foundation attracted more than 225 educators and foundrymen to Cleveland on March 13-14. This number comprised a record turnout for the meeting.

At the opening session, James H. Smith, Central Foundry Division, General Motors Corp., president of FEF, welcomed the gathering and expressed his gratification at the interest demonstrated by the number of persons in attendance.

Two panel discussions featured the conference. The first concerned "Training Engineering Students in Cast Metals." Panel members were George K. Dreher, Steel Founders' Society of America, moderator; Warren C. Jeffrey, University of Alabama; C. S. Crouse, University of Kentucky; B. W. Niebel, Pennsylvania State University, and J. F. Wallace, Case Institute of Technology.

Discussing "The Development of Student Interest in Cast Metals," Prof. Jeffrey stated that work to interest students ideally should begin in high school. Local industry can increase the interest of students in cast metals and influence them to take foundry work in college. Industry also can help to make available good educational movies.

A further important area is the counseling of high school students. Prof. Jeffrey also recommended that foundries co-operate to set up plant visits by groups of freshman engineering students. On the other hand, members of the industry would do well to visit campuses to speak before student groups on new developments in cast metals.

Prof. Crouse, whose topic was "Teaching Cast Metals in Engineering Curricula," spoke of the tendency of educators and members of industry to be regarded as separate groups with unrelated activities. In reality, he said, they are working for the same goal, and the need is for more co-ordinated effort.

Discussing recommendations on engineering curriculums, Prof. Crouse said that the trend increasingly is toward fundamentals, with specialization more the province of graduate study.

At the University of Kentucky, students majoring in the foundry program receive their degrees in either mechanical or metallurgical engineering. These students take three or four foundry courses as upperclassmen.

Prof. Niebel's subject was "Industrial Activities on the Campus." He emphasized the need for the close co-operation of industry with educational institutions.

At Penn State, groups of several diverse types of engineering students are formed, and each is given a problem in a nearby industry. This practice creates real enthusiasm on the part of students because it shows them their training in action, on a practical plane.

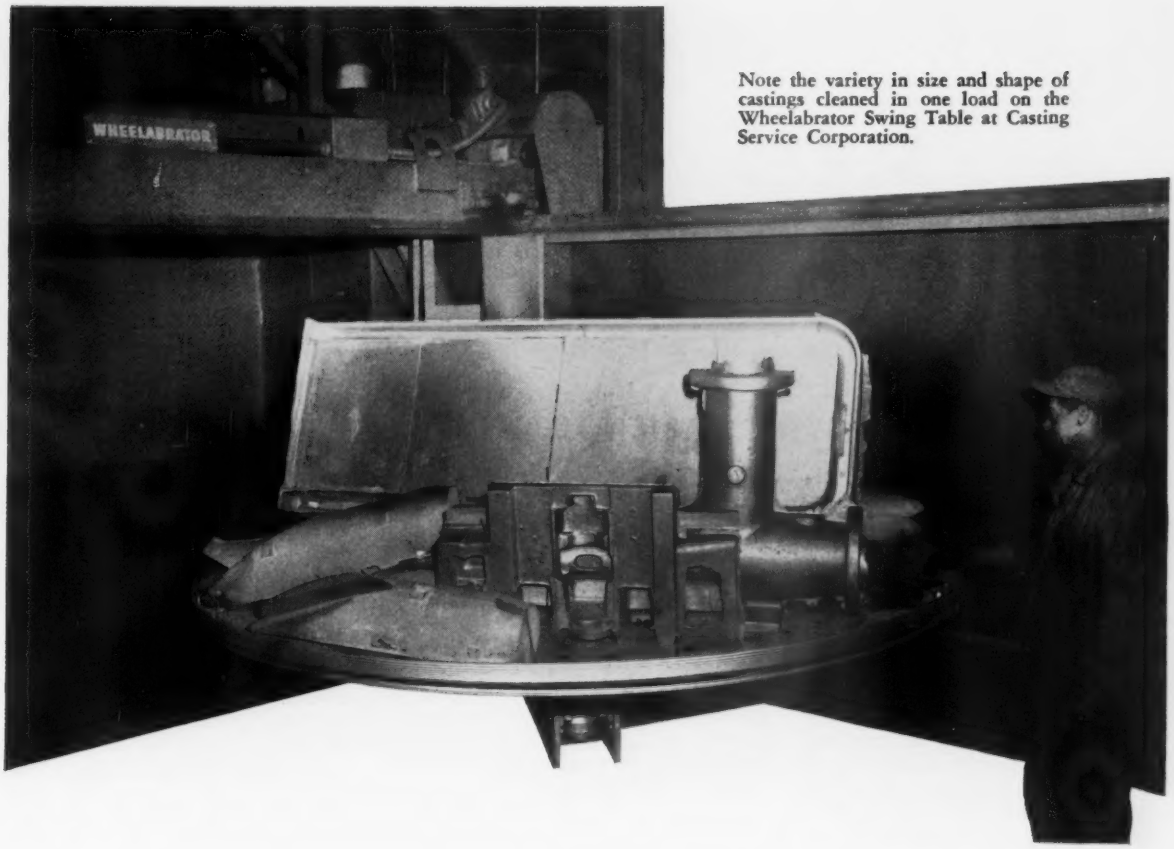
Prof. Niebel went on to list several types of help industry can provide educators. These include aid with teaching facilities, setting up plant inspection trips, offering summer employment (for both students and faculty members) and co-operative program jobs, supplying films and other visual aids and sponsoring research programs.

Prof. Wallace discussed "The Development of Scientific Literature in Cast Metals." He stated that the best criterion of what we know in a given field is the quantity and quality of literature available in it. Research always begins with a survey of the literature to determine known data.

The development of scientific literature is vital to all segments of the foundry industry for its future progress. Currently, the industry has a good literature, Prof. Wallace said.

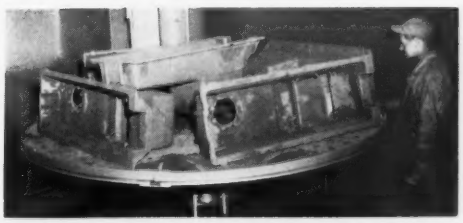
The second panel dealt with "The Engineering Graduate Moves into the Foundry Industry." Panel members were H. P. Skamser, Michigan State University; D. C. Ekey, Lebanon Steel Foundry, Lebanon, Pa.; W. M. Dalton, Dalton Foundries Inc., Warsaw, Ind.; and B. C. Yearley, National Malleable & Steel Castings Co., Cleveland. Marion J. Allen, American Steel Foundries, Chicago, acted as moderator.

Mr. Skamser's topic was "Recruiting Engineering Graduates." He stated that the recruiting job is 20 per cent getting interviews, 40 per cent conduct of interviews and 40

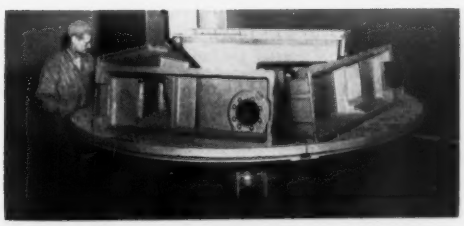


Note the variety in size and shape of castings cleaned in one load on the Wheelabrator Swing Table at Casting Service Corporation.

Whether they're long — or short — or tall
WHEELABRATOR® Swing Table cleans them all!



Diesel engine oil pans are cleaned 5 at a time. These gray iron castings are 46½" long, 15½" wide and 17" high.



Blasted 3 minutes on each side, this is how the castings look after having been scoured of sand and scale.

Ability of a 96-inch Wheelabrator Swing Table to clean mixed loads of large and small castings is an important extra advantage for Casting Service Corporation of LaPorte, Indiana. Being a jobbing foundry, it requires speed and flexibility in its equipment to meet customer deadlines and demands. Gray iron and semi-steel pieces are cleaned in the green state and after normalizing, without waiting to accumulate loads of castings of the same size and weight. This provides fast, thorough, low-cost cleaning, while permitting a steady flow of work.

For detailed information on the Swing Table story, send today for Bulletin No. 119D.

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World's Largest Manufacturer of Airless Blast Equipment

Illustration shows the large attendance at the annual banquet

per cent followup. His suggestions for effective recruiting include the following: Visit campuses regularly, except at the ends of semesters, when students are busy with examinations. Keeping in mind that most students are signed up by April, don't start too late. Concentrate on good interviews. Get to know faculty members. Use summer employment.

Discussing "Training Young Engineers in the Foundry Industry," Mr. Ekey stressed the need for newly employed engineers to be given a chance to adjust to the plant. Conversely, old employees must be adjusted to the engineer.

A capable top man should be in charge of the training program. It must be remembered that the training problem is orientation, not technical training—don't confuse the engineer with the apprentice. The engineer's talents must be adapted to specific plant problems. The training program should measure aptitude, determine assignments and do a weeding out job.

Mr. Dalton spoke concerning "The Utilization of Engineers in the Foundry Industry." He explained that his company has 280 employees, of whom five are in engineering capacities, as plant, methods, sand, metallurgical and quality control engineers. The company also currently needs a sales design engineer and an engineer to gate and plan jobs.

Increasing mechanization in foundries shows the need for more engineering personnel, Mr. Dalton said. Power consumption by his firm, for example, has risen 500 per cent since 1940 and is expected almost to double again by 1960. Similarly, depreciation on the company's equipment has gone up 12 times since 1940.

Dalton Foundries feels that its engineers have saved the company thousands of dollars. The sand engineer, for example, saved $15,000 annually by having sand additions mixed with water and brought to the muller as a liquid. Similarly, an engineer-inspired radiographic installation saved $7000 in the first eight months by increasing yield.

Mr. Dalton expressed the opinion that engineers do not belong in line jobs. They are valuable enough, he said, to be used as staff personnel who consult with line supervisors. His company has not hired engineers directly from school since it has wanted mature, trained men.

Speaking on the "Growth and Development of Engineers in Industry," Mr. Yearley said that growth and development are joint responsibilities of the engineer and industry. Increased profits stem from personnel who can widen markets, improve products and cut costs, and engineers are benefited by those profits.

A company must provide opportunities for engineers, and the engineers must take advantage of them. The engineer should be given tools commensurate with his ability and training. He should not be given routine tools and assignments and be expected to produce miracles.

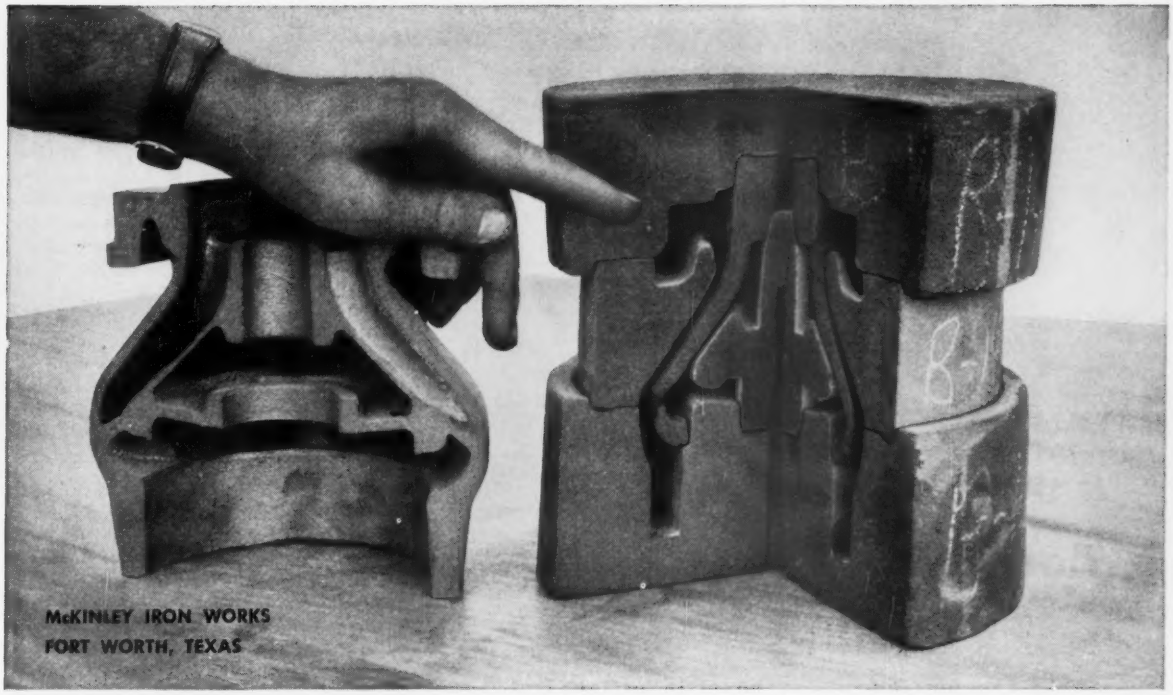
Mr. Yearley recommended that engineers be used to take advantage of the shift of the foundry industry from an art to a science. Instead of giving them line jobs, he said, make every assignment a challenge to their intelligence and training.

Speaking on "Marketing Aspects of Engineering Education in Cast Metals," Richard Meloy, marketing director, Gray Iron Founders' Society, Cleveland, discussed some of the results of a recent market survey conducted by that organization. These results show that both buyers and designing engineers want and need more data on castings. The answers to the questions also showed the educational job that must be done if the industry is to ship more castings.

The engineering school offers the first opportunity to make the student familiar with parts designed for casting. Mr. Meloy believes that the instructor can do much if he will tell the student frequently that the shortest distance between raw material and the finished product is a casting. Education of customers' engineers in the design of castings and of foundry salesmen in the latest foundry processes will play an important part in the future of the industry.

Discussing "Teaching Engineering Students in Cast Metals," at the luncheon on Mar. 13, Colin Carmichael, editor, *Machine Design*, pointed to the present trend in undergraduate teaching, which is increasing emphasis on know-why facts and moving in a direction away from instruction in specific techniques or processes. This trend means that the industry no longer can count on the undergraduate curriculum to provide the majority of engineers with instruction in specific techniques of foundry work.

Mr. Carmichael believes that this change in emphasis offers an opportunity for the foundry industry to play a constructive role in the new forward look which engineering education is acquiring. The foundation can extend its efforts to educate educators to see that advantages of castings are presented in the various broad courses in engineering ma-



Nothing's too complicated for McKinley and Cities Service Delco Core Oil!

Talk about tough cores! McKinley Iron Works once had to make one for a rod 18 feet long with a triangular cross section measuring 2 inches by 6 inches.

Another time, they produced a casting weighing 22,000 pounds . . . and every day they turn some out weighing but a few ounces.

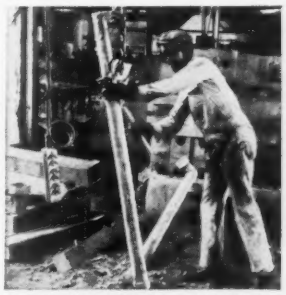
Yet, despite this tremendous diversification, McKinley manages to turn out 35 tons of castings a day, using only one core oil . . . Cities Service Delco #54.

"The reason I originally switched to Cities Service was because their lubrication engineer could give me exact specifications of their products," says President DeWitt McKinley.

"Other companies wouldn't or couldn't do this. The Cities Service engineer not only explained the makeup of the various Cities Service oils, but worked closely with me to fulfill my exact needs.

"The result was the selection of Delco #54 for all cores, a choice which has eliminated any chance of error among our employees and thus saved considerable time and money."

Like Mr. McKinley, you'll find a Cities Service Lubrication Engineer is ready and willing to help you find the precise type of core oil suited to your foundry operation. Call him in for a talk. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.



Getting the Shakedown, McKinley casting has core sand removed. Cores always have good collapsibility, thanks to Cities Service Delco #54 Core Oil.

Big Core, Big Casting strike interesting contrast with smaller core and casting in picture at top. McKinley has made castings ranging from a few ounces to 22,000 pounds, using one core oil . . . Cities Service Delco #54!

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Available in any length . . any number of plies in widths up to 72″ . . . any cover thickness. Want extra safety, extra belt life? See your Quaker-Quaker Pioneer Rubber distributor today about Kaloric conveyor belting!

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terials. The cause of castings can be helped mightily by supplying engineering schools with illustrative material, such as slides, movies and actual parts for classroom demonstration.

Trustees at large elected at the annual meeting of the foundation are as follows: P. F. Bauer, general manager, Industrial Division, Allis-Chalmers Mfg. Co., Milwaukee; J. H. Johnston, vice president, National Roll Division, General Steel Castings Corp., Avonmore, Pa.; Charles H. Ker, president, Dalton Foundries Inc., Warsaw, Ind.; Lloyd McNeil, assistant to the president, Alabama Pipe Co., Anniston, Ala.; and R. B. Parker, assistant to president for personnel, American Brake Shoe Co., New York.

Founding member societies have appointed the following to serve as trustees of FEF for a period of two years: American Foundrymen's Society, A. V. Martens, president, Pekin Foundry & Mfg. Co., Pekin, Ill.; Foundry Equipment Manufacturers Association, W. O. Vedder, vice president, Pangborn Corp., Hagerstown, Md.; Gray Iron Founders' Society, Ralph M. Hill, president, East St. Louis Castings Co., East St. Louis, Ill.; Malleable Founders' Society, Tom T. Lloyd, vice president, Albion Malleable Iron Co., Albion, Mich.; Non-Ferrous Founders' Society, Phillip Lankford, East Birmingham Bronze Foundry, Birmingham; Steel Founders' Society of America, R. P. Brewer, vice president and treasurer, Symington-Gould Co., Depew, N. Y.

New Officials Elected

The following officers of the foundation were elected by the new board of trustees: President, Chester V. Nass, vice president and general manager, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago; vice president, Frank X. Bujold, general manager, Foundry Division, Ford Motor Co., Dearborn, Mich.; secretary-treasurer, E. M. Knapp, president, Ferro Machine & Foundry Inc., Cleveland; executive director, E. J. Walsh.

Retiring president, James H. Smith, manager, Central Foundry Division, General Motors Corp., Saginaw, Mich., outlined the progress of the foundation during the past year. Membership increased, although the rate was not as great as had been hoped for. However, the work done gives indication of providing a good number of new members during the next year.

During the 1956-57 year, the foundation received registrations from 443 engineering students. During the year 155 scholarships were awarded

Circle 658 on Inquiry Card—Page 51

Announcing Schumann's Research and Refining

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SEE US IN CINCINNATI AT THE CASTINGS EXHIBIT—BOOTH 203

THE REVOLUTIONARY **NEW** SCHUMANN

C.P.* BRASS AND BRONZE INGOT BAR

*KAUFMAN *C.P. (Controlled Process)*

Featuring a NEW HIGH IN QUALITY above and beyond the specifications

Now, I. Schumann & Co. answers the growing demand for a quality brass and bronze ingot with none of the disadvantages of either the old fashioned "rough-top" ingot or the newer charcoaled "smooth-top" ingot. Made by refining methods that continue where older methods stop, and poured under rigidly controlled conditions to give a new high in quality to a new and different shape known as the C. P. Brass and Bronze Ingot Bar.

Schumann Brass and Bronze Ingot Bars will save trouble, time, and money for you in all phases of foundry operations. Write wire, or call us today for our new booklet, "ABOVE AND BEYOND THE SPECIFICATIONS" describing the new C.P. Ingot Bar and illustrating how to recognize quality.

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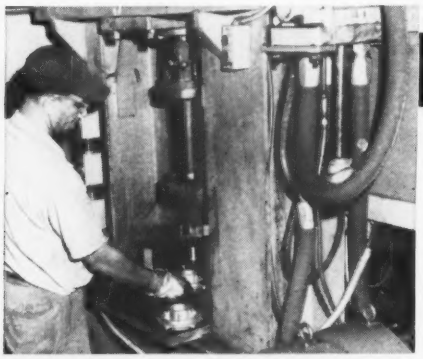
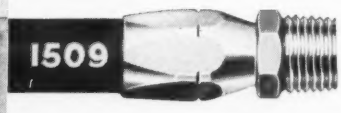
WITH AEROQUIP BULK HOSE AND REUSABLE FITTINGS!

Make replacement hose lines quickly, easily with Aeroquip Bulk Hose and Reusable Fittings. Just cut the hose to length and attach the reusable fittings with ordinary bench tools. Ask your Aeroquip Distributor about this time-saving, money-saving idea. He's listed in your Yellow Page Telephone Directory.





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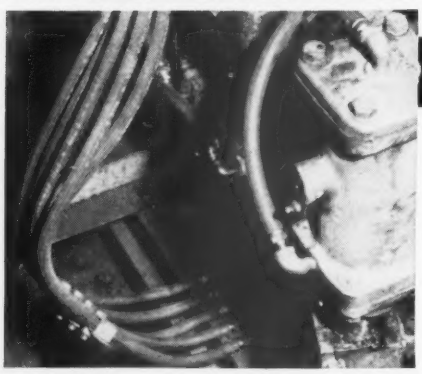

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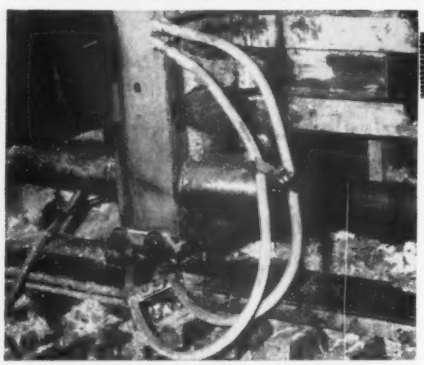

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Use Aeroquip 1546 High Pressure Hose with Reusable Fittings for synthetic hydraulic fluids (phosphate ester and chlorinated types). For pressures up to 5000 psi. Sizes from ¼" to 2".

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by foundation schools in the first semester and 157 in the second semester. As in the past, student listings were published by the foundation as special editions of the *Foundry Engineer*.

Of the 254 FEF registrants who graduated during the school year ending last June, 219 notified the foundation of their employment location. Of these, 114 were employed by foundries or firms maintaining foundry operations and by companies supplying or equipping foundries, 51 were employed by major castings users, and 26 entered the teaching profession or are taking advanced studies. The military services took 14, and 14 reported employment in companies having no connection with cast metals.

Program Activity Expands

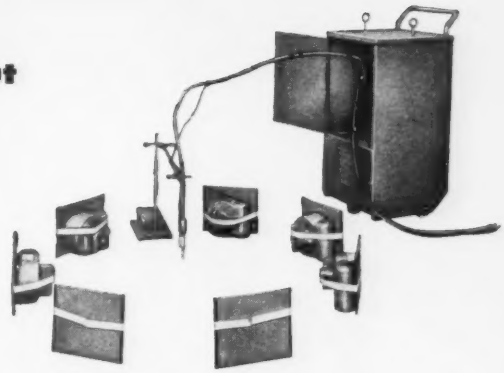
Development of the engineering educational program continues at 16 FEF schools, according to Mr. Smith. Foundry laboratory facilities in schools increased in value by $105,550 during the past year. A total of 73 faculty members now are engaged in teaching foundry courses. The number of courses devoted completely or partially to foundry and cast metals, and available on a required or an elective basis, increased from 105 last year to 124 this year. During the present school year 4772 students are enrolled in foundry courses.

The report of the University Advisory Committee was made by Prof. Douglas Williams, Ohio State University, who acted as chairman at the meeting of the group. The committee made a number of recommendations concerning engineering graduates' salaries, training, job assignments and related areas. The committee also recommended study of the aims of the FEF and of the recruiting, placement and assimilation of engineering graduates in the foundry industry.

Hermann P. Good, Textile Machine Works, Reading, Pa., presented the report of the Industry Advisory Committee. Its recommendations included that consideration be given to students in teachers colleges who will teach in vocational schools, to freshmen and sophomores in engineering colleges as well as to juniors and seniors and to students or teachers who may be of help in teaching foundry work. The committee also expressed concern about the possibility of some of the participating schools abandoning their laboratories. It suggested that foundry laboratories not only should be maintained, but also that they should be improved.

some people have queer notions about

RADIOGRAPHY WITH ISOTOPES



Here's a typical multiple-specimen setup . . . seven castings radiographed simultaneously with a T.O. model 402 panoramic Cobalt 60 unit.

Many a plant, uneasily aware that it is missing the profits of radiographic inspection, still holds back for one mistaken "reason" or another. Here are some we run into . . .

"out of my league" . . . *costs too much*

Not so. An iridium 192 machine costing as little as $1700 may be fully adequate to your needs. *Indeed, average equipment cost is less than $2500.*

needs a *specialist* to run

On the contrary, a practical on-the-job training course in our Cleveland laboratory (free tuition to buyers) equips any intelligent employee with all he has to know.

takes forever to make a radiograph

Not so. You can x-ray 1" steel in 30 seconds, 3" sections in 4 minutes with the Cobalt 60 sources available today.

gamma radiographs are no good

Not so. If you use the right source for the right job you'll have no trouble getting the 2% detail sensitivity required by exacting inspection codes.

it's dangerous; we're afraid of it

No reason to be: Technical Operations modern equipment is safe and simple-to-handle.

not for me; my stuff is different

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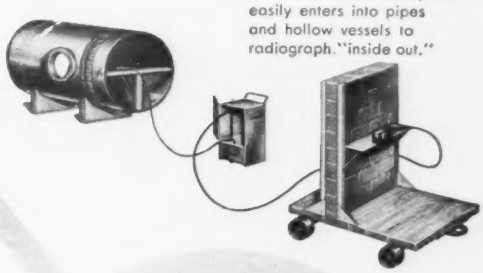

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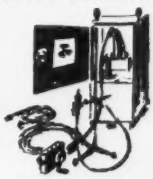

TO402
Cobalt 60 Unit

TO404
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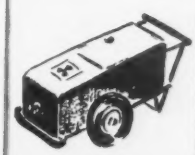

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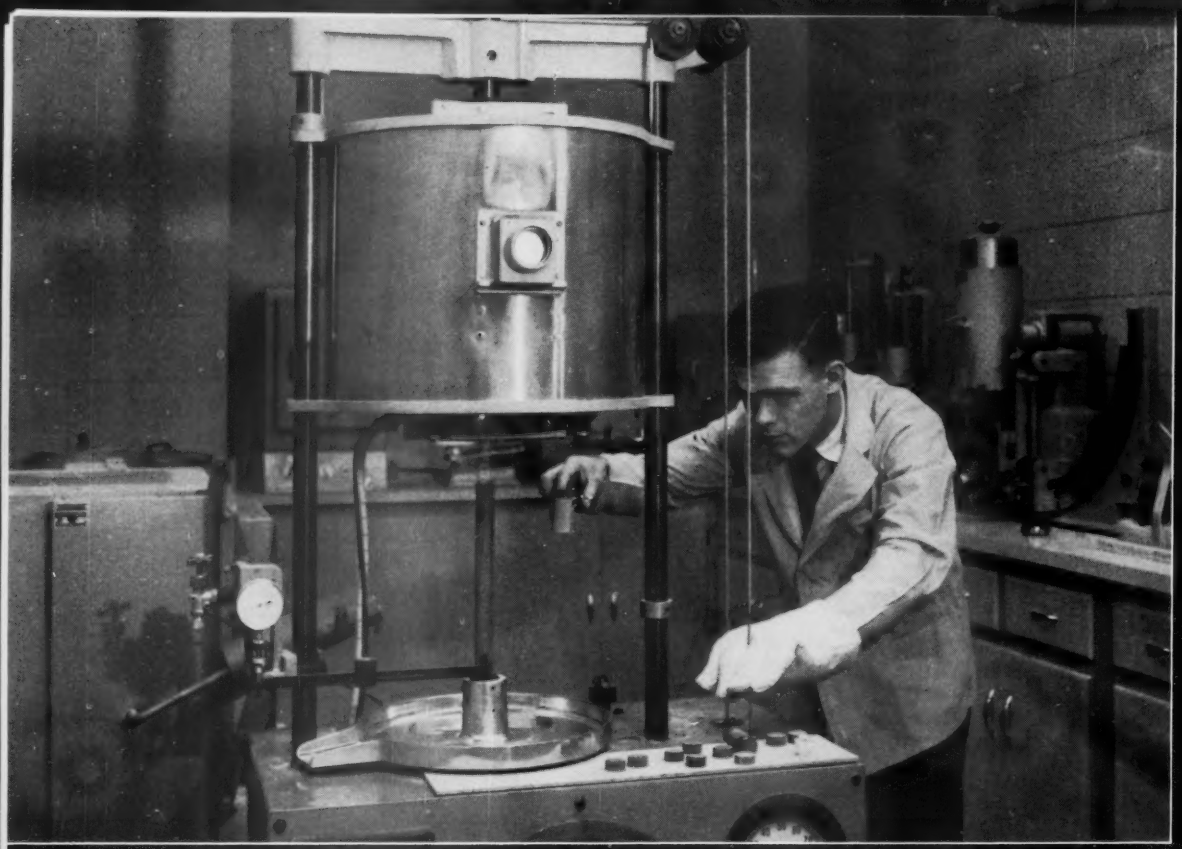

At Magcobar's Des Plaines, Illinois, laboratory, A. H. Zrimsek uses modern methods for foundry sand research.

SCIENCE and SAND

. . . Recipe For Progress

In new laboratories at Des Plaines, Houston and Greybull Magcobar technicians are busy with silica, bentonite, water and a host of other ingredients, taking the guesswork out of sand formulas. Applying modern research methods, these scientists are *proving* the "hows" and "whys" of foundry sand practice.

Magcobar invites the technical and research groups of the American Foundries to use Magcobar facilities for the solution of various industry-wide problems relating to sands.

Write Des Plaines for our latest foundry technical bulletins. Look to Magcobar, producers of YELLOWSTONE bentonite, for further revealing recipes for progress.

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MAGNET COVE BARIUM CORPORATION

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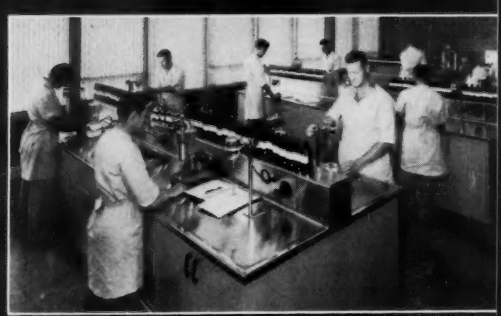
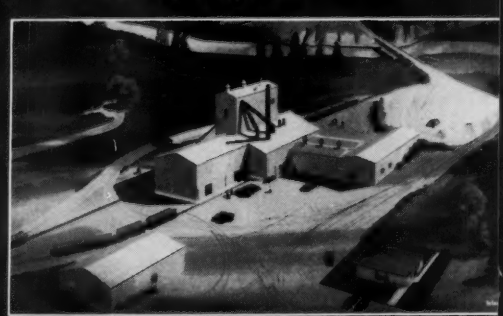


Magcobar technicians in the company's big research laboratories in Houston strive for constant improvement of Magcobar products.



This Magcobar plant at Greybull, Wyoming, where YELLOWSTONE is mined and processed, is the world's largest producer of bentonite, and includes a complete quality-control laboratory.

Industry Briefs

HARSCH Bronze & Aluminum Foundry, division of Ferro Machine & Foundry Inc., Cleveland, has been sold to Crucible Mfg. Corp. The latter, subsidiary of Consolidated Foundries & Mfg. Corp., Chicago, operates Crucible Steel Casting Co. in Cleveland and foundries in Milwaukee and Rockford, Ill. Harsch foundry, established in 1914, was acquired by Ferro Machine in 1952. Ferro disposed of its gray iron foundry in Cleveland two years ago.

NRC Equipment Corp., subsidiary of National Research Corp., Newton Highlands, Mass., has opened a district sales office at 19185 James Couzens Highway, Detroit, to serve Michigan and the Fort Wayne, Ind., and Toledo, O., areas. William C. Long has been appointed manager of the new office. Wild-Barfield Electric Furnaces Ltd., Watford, England, has been licensed for the manufacture and sale of NRC equipment in England.

Lester-Phoenix Inc., Cleveland, has added an auxiliary plant for machining operations. Finished, inspected components are delivered to the nearby main plant where they are assembled into injection molding and die casting machines manufactured by the company.

R. G. LeTourneau Inc., Longview, Tex., has appointed the following distributors for industrial hoists and jib cranes: Benkart Steel & Supply Co., Coraopolis, Pa.; John J. Connell Co., St. Louis; William H. Ziegler Co., Minneapolis; and Hallidie Machinery Co., with main office in Seattle and branches in Portland, Oreg., and Spokane, Wash.

Yale & Towne Mfg. Co., Philadelphia, has moved its Cleveland sales and service branch into larger quarters at 3560 East 93rd St. A sales and service center has been established at 47 Oak Knoll Rd., Box 168, Hubbard, O., to serve the Youngstown, O. area. The Akron, O., area will be serviced by a suboffice at 221 East Center St., Akron. The Materials Handling Division has established lift truck sales and service sub-branches in Baltimore, at 1115 East 30th St., to serve eastern and central Maryland and industrial accounts in Washington, and in Harrisburg, Pa., at Hill Station, P.O. Box 39, Route 22, R. D. 3, to cover east-central Pennsylvania. Earthmovers Equipment & Supply Inc., 6029 Fairmont Extension, San Diego, Calif., will represent the division in that area for lift truck sales accounts previously serviced by the Los Angeles branch.

Ellicott Machine Corp., Baltimore, has acquired a controlling interest in McConway & Torley Corp., Pittsburgh, and its subsidiary, Baltimore Foundry & Machine Corp., Baltimore. McConway & Torley will operate as a separate corporation and a subsidiary of Ellicott, with Allan W. Mund, president of Ellicott, as chairman of the board. Grover L. Michael will continue as president and Harold F. Dunbar, vice president.

Baker-Raulang Co., Cleveland, has appointed three dealers to distribute its line of industrial trucks in Tennessee. They include Ortmeier Machinery Co., 1308 East 23rd St., Chattanooga, Peffen Machine Co., 316 Sixth Ave. South, Nashville, and Dempster Machine Co., 1649 Riverside, Knoxville.

Metal Treating Institute, New Rochelle, N. Y., reports January, 1957 billings of $3,494,700, or 12.1 per cent more than the $3,116,400 billed in January, 1956.

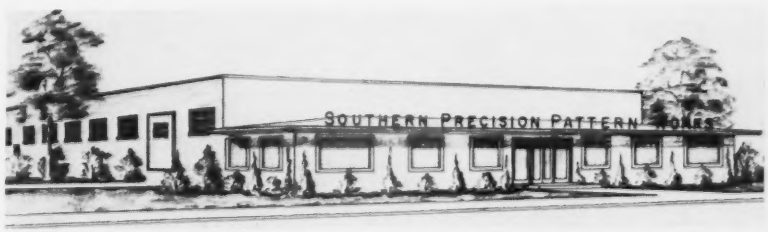
H. K. Porter Co., New York, has combined Laclede-Christy, St. Louis, McLain Fire Brick, Pittsburgh, and the recently acquired Mullite Refractories, Shelton, Conn., under one management, to be known as the Refractories Division. S. R. Gurley Jr. will be vice president-general manager of the new division. W. Alfred Turner, former vice president-general manager of McLain Fire Brick, has been made a vice president of H. K. Porter Co. and will act as advisor and consultant on refractories. E. M. Richardson is general sales manager of the division.

Standard Steel Treating Co., Detroit, has purchased Steel Treat Inc., Detroit, a complete production heat treating plant which it will operate as Standard Steel Treating Co. Plant No. 2. The new property houses four distinct heat treating lines comprised of completely controlled atmosphere heat treating equipment and has a total daily capacity of more than 100,000 lb.

Crescent Carbon Corp., a subsidiary of Crescent Corp., soon will put into operation a carbon and synthetic graphite plant under construction between Rosamond and Lancaster, Calif. The plant will produce carbon and graphite electrodes, anodes, electrolytic anodes and other carbon and graphite products.

Bell Aircraft Corp., Niagara Falls, N. Y., has acquired Lake Erie Engineering Corp., Buffalo, and will operate it independently as a wholly owned subsidiary. Lake Erie manufactures major types of hydraulic equipment, including die casting machinery.

Pittsburgh Metallurgical Co., Niagara Falls, N. Y., has put into operation, at its Calvert City, Ky.,



Southern Precision Pattern Works Inc. is moving into a new, 26,000 sq ft building at 1500 Georgia Rd., Irondale, Ala., a suburb of Birmingham. The company's former address was 4410 First Avenue North, Birmingham. In addition to enlarged pattern shop space, the new building will include a precision casting section, special plastics area, increased office space and a big engineering department

plant, what is said to be the world's largest furnace for production of ferroalloys. The furnace cost $1½ million and will increase the plant's productive capacity 25 per cent.

Link-Belt Co., Chicago, has moved its Newark, N. J., district office to larger quarters at 293 Morris Ave., Summit, N. J. The new Summit office will continue to serve Passaic, Bergen, Morris, Essex, Sussex, Middlesex, Somerset, Hudson, Union and Monmouth counties in New Jersey.

Acheson Colloids Co., Port Huron, Mich., has appointed Apco Industries Ltd., 10 Industrial St., Leaside, Toronto, Ont., as distributor in Ontario and Quebec for its dispersions of colloidal graphite, molybdenum disulfide and other solids.

Shell Equipment Inc. has moved its headquarters to Ninth and West Crawford Sts., Connellsville, Pa. A sales office will continue to be maintained at former headquarters, Third and Mill Sts., Bridgeport, Pa.

Fuller Co., Catasauqua, Pa., has begun a 50-per-cent expansion of its local manufacturing facilities. The expanded plant will be completed and ready for production by early summer.

AAA Machinery & Equipment Co., Cleveland, has completed a 5000-sq-ft addition, equipped to handle all phases of machinery rebuilding—the specialty of the company.

NONFERROUS FOUNDERS TO MEET

At Cincinnati on May 9

EXECUTIVE and operating heads of nonferrous foundries will attend two special national meetings of the Non-Ferrous Founders' Society in Cincinnati, Thursday, May 9. Open to all foundrymen, the two meetings will be held in the Netherland-Hilton Hotel during the AFS convention.

In addition to the two open meetings, the NFFS board, with National President E. J. Metzger, president of Multi-Cast Corp., Wauseon, Ohio, presiding, will hold its annual meeting.

An NFFS Government - Industry Luncheon session, will be held Thursday at 12:30 p.m. Featured will be talks by BDSA representatives, a report on the NFFS consumer survey, the president's review of society activities for the past year, and a panel discussion entitled "What to Do About Rising Costs."

BDSA speakers will be William A. Meissner, deputy director of the Copper Division, and Manley Brooks, deputy director of the Aluminum & Magnesium Division.

Resume of customer ideas on nonferrous castings and castings producers, business practices, purchasing attitudes, future consumption of castings, and suggestions for improving customer relations—brought out in the consumer survey—will be presented by M. E. Nevins, president, Wisconsin Centrifugal Casting Co., Waukesha, Wis.

NFFS President Metzger will appear in a dual role at the luncheon, giving his "state of the society" address and also participating in the costs session along with William A. Gluntz, president, Gluntz Brass & Aluminum Foundry Co., Cleveland. Messrs. Metzger and Gluntz, assisted by other panel members will tell how foundries can cope with rising costs by:

1. Improving productivity, including consideration of mechanization.
2. Reviewing their cost systems to make sure they know their true costs.
3. Bringing their pricing formula up to date in accord with current costs.
4. Selling increased costs to the consumer.

Highlighting the May 9 evening program will be the NFFS annual banquet, preceded by a reception at 6 p.m., both in the Restaurant Continental of the Netherland-Hilton. Banquet speaker will be Fred Smith, president, Fred Smith Associates, Cincinnati management consultants. Mr. Smith will discuss "Responsibility of Privilege."

New officers and directors of NFFS will be announced and introduced, with President Metzger passing the gavel to his successor, the current first vice president, C. J. Egetter, president, Crown Brass Mfg. Co., Alhambra, Calif.

HOW TO DO IT

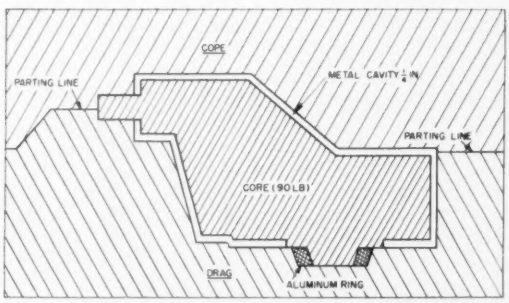
Aluminum Ring Guides Heavy Core Into Place with No Mold Damage

By DONALD E. HARDER
Foundry Foreman
Fairmont Railway Motors Inc.
Fairmont, Minn.

AN ALUMINUM RING used to guide a heavy water jacket body core into the drag eliminates the necessity for making a guide core. The ring is turned to the same size and shape as the print on the bottom of the body core but smaller than the opening in the casting so no metal touches the ring. See accompanying diagram.

After the molder draws the drag pattern, he sets the ring in the core print, then sets the heavy body core. The ring guides the body core into place without danger of knocking off the edge of the print and getting sand under the core. The rings have been used in the author's foundry several hundred times and still are as good as new.

Previously a ram-up core was used as a guide but it broke during jolting of the drag. Then a set core was used, but making it required a loose ring in the corebox, and it became a costly item. Next step was use of the aluminum ring, which has proved quite successful.



Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea.

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NEW in cutting action

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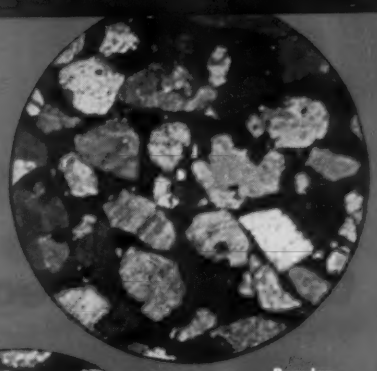
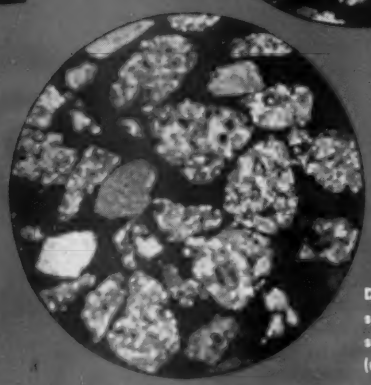


Regular Aluminum Oxide (unretouched)



DA Borolon smaller crystal structure (unretouched)

NEW

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for resinoid bonded snagging wheels

A big forward step to new efficiency in grinding steel mill billets and foundry castings. Note the smaller crystalline structure of DA Borolon within each abrasive cutting particle! This means inherent toughness to resist fracture during grinding stress . . . more and sharper cutting edges on the wheel face . . . longer, useful wheel life . . . and more production per wheel dollar. Test after test on swing frames, floor stands and portables prove that Simonds wheels with this new aluminum oxide abrasive belong on your grinders for more production at lower cost. Write for descriptive bulletin.

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Record Attendance Drawn to
California Regional Conference

By WILLIAM G. GUDE
Managing Editor

WEST COAST foundrymen turned out in record number for the successful California Regional Foundry Conference held at the Hotel Claremont, Berkeley, Calif., March 15-16. Attendance at the meeting, sponsored by the Northern and Southern California Chapters of the American Foundrymen's Society, totaled about 425. The former chapter acted as host.

Twelve technical sessions, a management luncheon and a dinner meeting were included in the program arranged by the conference committee under the general chairmanship of Charles R. Marshall, Industrial & Foundry Supply Co., Oakland. Harold Hirsch, American Manganese Steel Div., American Brake Shoe Co., Oakland, was chairman of the technical section.

Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill., and national AFS president, discussed various of the activities of the society in speaking at the luncheon and dinner sessions. Northern California president Harold E. Henderson, H. C. Macaulay Foundry Co., Berkeley, presided at the dinner, which had Gilbert S. Schaller, professor of mechanical engineering, University of Washington, Seattle, as principal speaker. Professor Schaller gave an interesting account of his observations of foundry practices in various European countries.

Charles R. Marshall, left, general chairman of the conference, shown with Harold E. Henderson, Northern California Chapter president, Frank W. Shipley, AFS president, and David B. Reeder of Electro Metallurgical Co.

Air Pollution Control: Smog has not yet become a critical problem in the Bay Area. But because there is evidence that it can become serious, a Bay Area Air Pollution Control District has been created. Benjamin Linsky, recently appointed air pollution control officer, said that rules and regulations yet to be adopted covering air contamination likely would be relatively strict but that the agency proposed to accomplish its aims through the assistance and co-operation of industry rather than by independent action.

The small microscopic particles that create smog are discharged principally by the metallurgical, petroleum and chemical industries and autos.

Apprenticeship and Education—Only about one-half of the trained journeymen molders needed annually in the area are being supplied by apprentice programs, according to to Clayton D. Russell, Phoenix Iron Works, Oakland, and chairman of the chapter's Apprentice Training Committee. He said that a survey of California foundries concerning their needs for graduate engineers indicated that approximately six times as many men are wanted as are available. Foundries show interest in enlisting mechanical, industrial and electrical engineers as well as metallurgical engineers.

The foundry apprentice program in the San Francisco area is making progress, and while it is not larger than 10 years ago, the completing apprentice is offering more to the industry, it was reported by Maurice C. Sandes, Division of Apprenticeship Standards, State of California. The apprentice receives constant supervision by monthly meetings of a joint management and labor apprenticeship committee.

Molder and coremaker apprentices registered with the state num-

Participating in session on education and apprenticeship were, left to right: Paul Crow, chapter Educational Committee chairman; M. C. Sandes, state Division of Apprentice Standards; Earl Paltenghi, H. C. Macaulay Foundry Co.; Clayton D. Russell, chapter Apprentice Training Committee chairman, and Prof. James S. Campbell of the University of California

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put the cost of sand conditioning and handling into a nose-dive for plants using this unique equipment. Without shoveling of any type, the Reddy Sandy separates sand from castings and cores and prepares it for the molder. Handy Sandy puts the sand overhead where it is available to the molder without effort. 30% to 70% production increases are commonplace. This same engineering excellence

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MILWAUKEE, WISCONSIN

...gives you better sand handling systems too

Complete Newaygo Sand Handling Systems exemplify this same type of creative engineering that lowers costs for you. They help produce more work from every foot of floor space and often eliminate several unnecessary operations that add to the cost of your castings but not to their quality. Newaygo systems take less time to install and erect as every unit is pre-assembled at the factory to save you time and money.

Formerly "The shovel gang," these 14 molders at Auburn Foundry, Inc. now spend a maximum amount of time preparing molds, and with less fatigue. Note air operated gates on hoppers that further eliminate effort on the molder's part. Cope and drap setups on system allow molds up to 30" x 33" to be produced.

Hoppers and conveyor service walkway are supported from overhead building steel structure. This feature gives unobstructed working area under hoppers and around molding machines.

Molds are handled on pallet cars through the mold storage and pour-off area. They are automatically dumped at end of lines into a vibrating pan conveyor. Pallet cars and boards are returned automatically to molder on an underneath track system.

"Foundry Business is BIG Business"

NEWAYGO engineering company
NEWAYGO, MICHIGAN

...and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

William S. Gibbons, left, and Philip McCaffery, right, were session chairmen, with Harry H. Kessler, Sorbo-Mat Process Engineers, speaker

ber 67 in the area out of a total of 1537 for all trades. For the entire state there are 14,633 registered apprentices, 109 of them molders and coremakers.

Objectives of the Foundry Educational Foundation and how it functions were explained by James S. Campbell, associate professor of industrial engineering, University of California, Berkeley. He emphasized the value of summer employment of students in foundries and described the facilities and operation of the school's foundry laboratory.

Application of Aluminum Alloys—Walter Bonsack, who is associated with William F. Jobbins Inc. at Los Angeles, compared the aluminum alloys of 30 years ago with those of today and outlined advances and improvements in composition and mechanical properties. He cited the changes in the 10 per cent magnesium alloy (220) from 25,000 psi to 42,000 psi tensile strength and from less than 5 per cent to over 20 per cent elongation. Alloy 220 is not section sensitive and actually has better properties in heavier sections than in lighter ones, rather than the reverse.

In reply to a question, Mr. Bonsack pointed out that although 220 is hot short, it can be cast successfully in permanent molds with good foundry practice. Its heat treatment is critical. Because the alloy is brittle as cast, any straightening must be done after heat treatment.

Coke's Relation to Cupola Operation—Various tests employed by the coke producer to insure that the desired quality is obtained in his product were described by J. W. Rendall, Great Lakes Carbon Corp., St. Louis. Advisability of screening out small sizes of coke from the cupola charge to increase efficiency of combustion was suggested by M. R. Gallo of the same company. Time, temperature and physical contact are determining factors in carbon pickup by the iron. Air requirements for proper combustion also were discussed.

Gating Pressure Castings—Improvements in sand mixtures and in riser design have been leading factors in bettering foundry practice in recent years, according to Dominic Coccione, Washington Iron Works, Seattle. He illustrated gating design for a number of large castings. These castings included cylinders in which bottom pencil gates introduced metal into the mold cavity at a 45-degree angle and a three-way choke was employed on the sprue-runner-gate system.

It is desirable to keep pictures of all castings produced so as to have a record of the gating arrangement. Another useful tool is a table giving total areas of various diameter gates; it provides a guide in assuring that the correct diameter of down gate is used.

"Knowing's Not Enough"—A film by this title was presented by F. H. Kobely, Columbia-Geneva Steel Division, United States Steel Corp., San Francisco. A safety film produced by U.S. Steel, it is based on the fact that awareness of accident hazards alone will not prevent injuries, because in most accidents caused by carelessness the injured man knew better. A way is suggested by which workers can be induced to act safely based on their knowledge of unsafe practices.

How To Handle a Mold—This discussion of how cleaning costs are affected by what occurs from the time a mold is made until it is poured was presented in April FOUNDRY, starting on page 117. It was prepared by Hubert Chappie, National Supply Co., Torrance, Calif.

Scrap Control—Reducing scrap castings in the nonferrous foundry starts with a program that is given the backing of management, it was

Speaker John W. Rendall, center, Great Lakes Carbon Corp., shown with the session chairmen Ernest Bosco, left, and Samuel D. Russell

Speakers included Dominic Coccione, center, Washington Iron Works, and Hubert Chappie, right, National Supply Co. H. F. Prior, Superior Electrocast Foundry, at left

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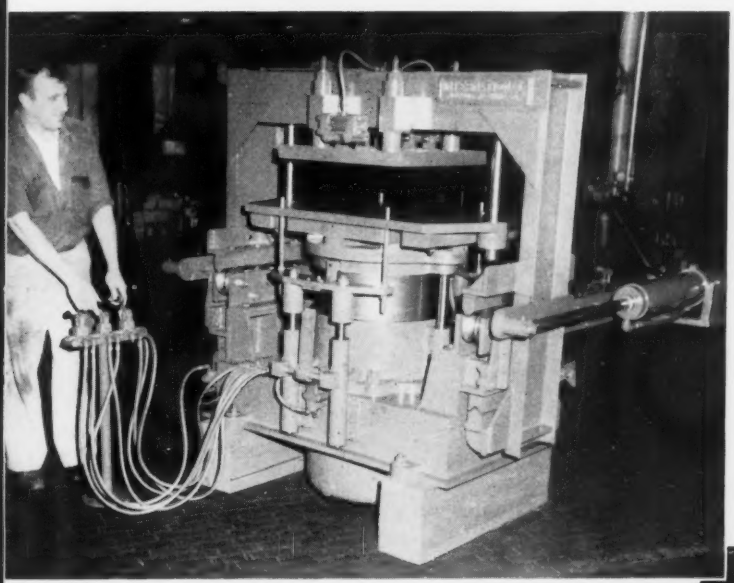
ANOTHER

NEW INTERNATIONAL

SK20

Jolt-Squeeze-Drop Strip or Pin Push Up

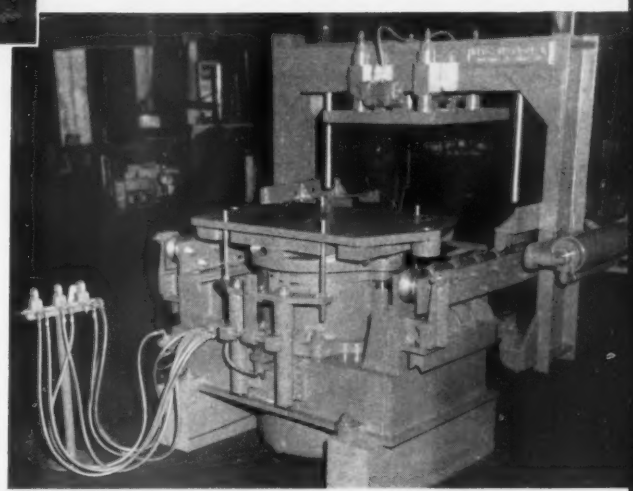
or Drop Strip Roll On - Roll Off



Here is a new machine, designed for larger requirements, incorporating sound engineering features, that can be made with

any size jolt
any size squeeze
any size draw
for any size job.

The SK20 illustrated has 20″ squeeze cylinders, an 8″ jolt cylinder, and is designed as a multiple molding machine—with a 4″ draw. Picture shows hand control valves. It can also be furnished with partial or completely automatic control cycle.



Operational Features of the SK20

- ★ Head moves out – away from table of machine for easy loading of sand and flask.
- ★ Head moves in – Large V guides insure proper alignment of head over table for accurate and square, uniform squeeze – and true draw.
- ★ Two large cylinders control the movement of the head with oversized deceleration valves for cushioning.
- ★ Can be loaded from front – side – or rear.

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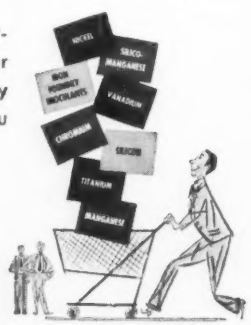
For a thorough description of forms, analyses, and uses of more than 30 stock ferro alloys write for bulletin FAI.



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stated by Martin G. Dietl. Patterns should be kept clean and bushings should be checked regularly for replacement when required. A card record of the pattern's history should include the sand mixture used, any special molding techniques, pouring temperature, jolts per mold and other common variables. A scrap record of the job can be entered on the back of the card.

Shaking out and inspecting promptly the first castings of a run can uncover possible molding errors. A daily scrap report should be cir-

Prof. Gilbert S. Schaller, University of Washington, was principal speaker at the conference dinner

culated among all supervisors concerned with production, and the superintendent, foremen and technicians should meet daily to discuss causes of defective castings segregated by the inspector. It was pointed out that a shop melting 40,000 pounds of metal daily and experiencing a 10 per cent scrap loss can save $4900 yearly by reducing this loss only 1 percentage point.

Foundry Resins—A general discussion of the application of resins for use in production of shell molds and cores was presented by Lee Stark, Plaskon-Barrett Div., Allied Chemical & Dye Corp., Edgewater, N. J.

He recommended that a complete cost analysis be made before starting production of a part with shell molding, because all castings are not economically suited to the process. Highly consistent castings can be obtained, but only if supervision is good.

Sand used has the greatest effect on shell molding of all the variables involved. Sand distribution over at least three, and preferably four, screens appears to be desirable, if not necessary. Minus 270 mesh and pan material should be kept at less than 15 per cent. Blending of sands has been investigated with good success, a 50-50 blend of silica and bank sands appearing to hold the greatest promise. In contrast to the

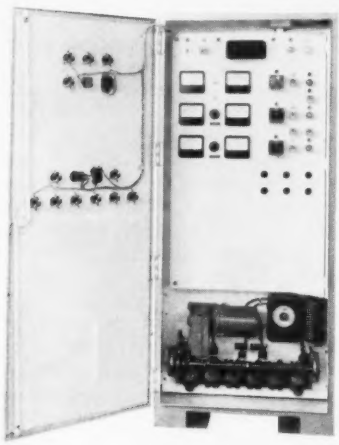
automatic

economical

accurate

fast

SAND CONTROL
IS HERE
RIGHT NOW!



Entire mixing sequence is automated from this single cabinet! *Sensing probe is in mixer* . . . consequently there is no increase in mulling time. Operates on any batch type mixer. Fast, foolproof setting for positive moisture control. Panel lights identify each phase of sequence.

Complete particulars sent on request.

HARTLEY Controls
CORPORATION
NEENAH, WISCONSIN

Circle 844 on Inquiry Card—Page 51

100-150 AFS fineness sands considered necessary a few years ago, sands of 50-60 fineness are now being used.

Because of lower cost and easier handling, the most rapidly expanding aspect of shell techniques is shell cores. These cores offer the opportunity to lower casting costs while at the same time affording opportunity for management to study the process and evaluate the potential advantages of shell molds.

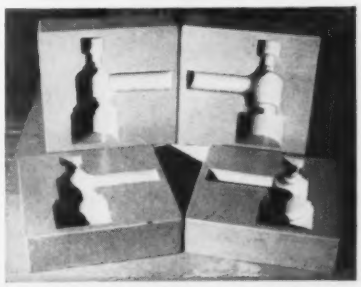
Vacuum Melting—Melting and casting in a high vacuum is the only known way to make parts to the extremely high specifications required for certain critical applications, according to Charles d'A. Hunt, Temescal Metallurgical Corp., Richmond, Calif. While such applications now are confined to government work, he feels that commercial uses will develop.

Harold C. Wegner, left, chairman of session addressed by Charles d'A. Hunt, center, Temescal Metallurgical Corp., shown with Jay Snyder, conference publicity chairman

The type of equipment required for this casting process develops a vacuum of one-tenth micron of mercury. At this level, not only the hydrogen and carbon monoxide are pulled out of the metal, but all nitrogen, phosphorus and sulphur are outgassed. High-grade graphite and certain ceramics have been found to be suitable mold materials, but a resin-bonded mold is not applicable to high-vacuum operations.

Gating and Risering—One properly placed riser can do more good than two improperly placed, said Harold F. Bishop, Exomet Inc., Conneaut, Ohio. He explained how to calculate riser dimensions for simple shapes and to apply such calculations to complex castings, which generally are a composite of simple shapes. Diameter of a riser is more important than its height in the matter of feeding because the relatively small surface area per volume of a thick, short riser increases the time

16 HOURS
VS.
65 HOURS



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80% STEEL — 20% PLASTIC

CUTS 49 HOURS . . .
MAKING THESE
CORE BOXES

DEVCON — THE PLASTIC STEEL . . . originally developed for making tools, jigs and fixtures in metalworking plants . . . brought a revolutionary new method to this leading foundry* . . . chopping hours off the time required to produce core boxes, molds, duplicates of wood and metal patterns. Tremendous savings are being shown daily . . . making low cost patterns, repairing and altering patterns, filling large or small blow holes in ferrous and non-ferrous castings, repairing and rebuilding machinery, and making blow boxes and shell molds or driers.

DEVCON — available in A, B, C and F types — becomes a strong, tough, metallic mass (similar to steel or aluminum) within 2 hours after addition of the special hardening agent. Once hard, DEVCON can be drilled, tapped or sawed with metalworking tools. DEVCON is non-shrinking, non-expanding . . . adheres to ferrous and non-ferrous metals, wood, glass and many other surfaces.
*NAME ON REQUEST

SAVE UP TO 75% IN TIME...
25% to 75% OF TOTAL COSTS
. . . OVER CONVENTIONAL
METHODS OF PATTERN-
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VISIT BOOTHS 107-109
The First Engineered Castings Show
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TECHNICAL REPRESENTATIVES AND DISTRIBUTORS IN ALL MAJOR CITIES

DEVCON CORPORATION
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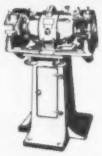
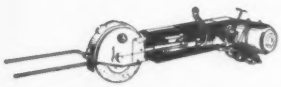
Circle 789 on Inquiry Card—Page 51

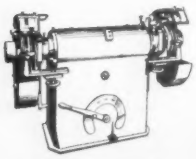
GRINDERS



DIRECT DRIVE



SWING FRAME



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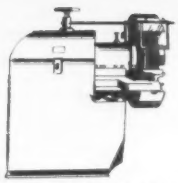

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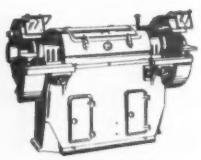

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PORTABLE 1/3 to 7½ hp

Welcome to the AFS Castings Congress and First Engineered Castings Show at Cincinnati, May 6 to 10. Come and see us at our plant!

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

the metal stays in the molten state.

Prolonging the molten state of the riser is the alternative to use of chills for speeding casting solidification. Because much heat is lost from the top of a riser, some type of insulating cover is useful. Substantial savings in feed metal requirements through use of insulated riser sleeves were demonstrated.

Foundries will achieve much higher yields in years to come as a result of research and development in risering practice, Mr. Bishop said.

Foundry Problems — Four major steps are available to the foundryman seeking to correct a casting defect, it was pointed out by Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis. These steps are: Change in metal composition; a different method of risering; use of chills; redesign of the casting.

A number of defective castings were submitted by local foundries for Mr. Kessler's analysis of the cause of the trouble. Among the points brought out was that extent of metal shrinkage can be altered by a change in type of scrap or source of pig iron used, even though chemical composition of the materials is the same.

There is an economic limit to what should be spent to improve yield. Because labor is such an important item in total costs, it is generally preferable to concentrate on increasing productivity.

The conference was concluded Saturday evening with a reception tendered by the Kaiser Steel Corp., Fontana and Oakland. Columbia-Geneva Steel Div., United States Steel Corp., San Francisco, was host at a similar party preceding the Friday dinner.

All of the conference photos are by courtesy of Robert A. Johnston, Brumley-Donaldson Co., Oakland, Calif.

Book Review

FBI Register of British Manufacturers, cloth, 7 x 9 in., 1124 pages, published for the Federation of British Industries by Kelly's Directories Ltd., and Iliff & Sons Ltd., Dorset House, Stamford St., London, S.E. 1, England. Price 42 s.

Guide to a substantial cross section of British industry lists the products and services of over 7000 member firms under more than 5400 alphabetical headings. A classified buyers guide and seven other sections provide addresses of companies and information about trade associations, proprietary names and trade marks. French, German and Spanish glossaries provide a reference for buyers not conversant with British product terms.

Binds cores better, more economically —only one accelerator needed

• Even large complicated cores turn out perfectly with RCI COROVIT® 7202 binder. Baking is fast, collapsibility excellent. The result is an ideal casting economically produced.

RCI COROVIT 7202 is sold with a non-toxic, non-staining accelerator which gives you excellent control over the self-curing rate. This material is identified as COROVIT 7200-A.

3 more reasons why foundry men like COROVIT:

1. No staining or contamination of working area by accelerator.
2. No toxic or unpleasant fumes during baking.
3. No dermatitis hazard with either binder or accelerator.

Get all these advantages with RCI Corovit® 7202

(U. S. PATENT 2,556,335)

1. Reduce core making time and labor —only one binder needed... superior rammability of mixture means less arboring and wiring.

2. Add only one accelerator — it's safe ...non-toxic and non-staining.

3. Speed baking—extremely fast baking ingredients are "prebaked" during manufacture.

4. Avoid core distortion—no sagging during transportation.

5. Improve collapsibility—lack of pitchy ingredients usually required for hot strength and clay substance needed for green strength makes for easy shakeout... also inhibits hot casting cracks.

SPECIFICATIONS

COROVIT 7202 binder

Viscosity (Gardner-Holdt @ 77°F.) . Z_2–Z_4
Lbs/gallon 7.8–7.9
Percent non-volatile..... 99–100

COROVIT 7200-A accelerator

Non-toxic, white, fine mesh powder

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If you would like full information on using this important new core binder, write to RCI for COROVIT BULLETIN F-11-R.

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Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol
Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride • Sebacic Acid
Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid
REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"Everyone has a lot more real talent, ingenuity, skills, leadership and management potential in his present employees than he suspects"

Gold in Them Thar Hills

I DON'T believe I ever have seen an organizational chart that wasn't out of date by the time it reached me—even one with the ink still wet. I guess it goes to show that trying to determine the tensile strength, elasticity, corrosion, abrasion and shock resistance, boiling point, getterdonety, and leadership-erosity of human beings still remains more of an art than a science—almost alchemy, in fact. Either that or the relative usefulness of the individuals who work together in groups keeps shifting with time and tide.

Unless I've got hold of the wrong dope, it would take a fully trained and seasoned professional at least three eight-hour days to make an exhaustive psychological test on any one individual. But, be that as it may, I for one (sort of a ham in this field) have had some great surprises when I saw what beautiful birds certain very ugly ducklings turned out to be. In fact, I've been so thoroughly surprised, so often, that I now thumb my nose at first impressions, not to mention second, third and fourth impressions.

It Takes Time—Looking back over a lifetime of sincerely trying to get the hang of getting acquainted with people, I've just about concluded that the process takes somewhere around four years, except in the stubborn cases. Mother (that's my wife, now chairman of the board of Lee Hobby Foundry) just about has me pegged after forty-some years of rather close acquaintance, and every once in a while she says she's not too sure.

I don't suppose there's been a time in the history of the foundry industry when we've spent so much effort and money trying to analyze every material element and factor that enters into the making or breaking of a foundry. We have developed amazing electrical, mechanical, chemical and statistical devices for increasing the quality and number of castings per average employee (of which, of course, there is not even one pure specimen in existence).

Then, too, one whale of a lot of money has been spent in research to make the metals we melt go farther and do a better job for our customers—another very worthwhile job of conservation and utilization.

More than Meets the Eye—Now! What I'm working my way around Robin Hood's barn to is that everyone of us has a darned sight more real talent, ingenuity, skills, leadership and managerial potential locked up in our present employees than we ever suspect, but it's covered by a thick crust of traditional rankings, accidental placings, calendar seniorities and—the thickest crust of all—an impenetrable noise barrier to the getting-acquainted process.

During World War II, more Horatio Alger career miracles sprang up overnight than I ever thought possible. Talk about ugly ducklings! Stenographers, literally overnight, took over complicated automatic screw-machines. In General Motors, one group of men who had never known anything but accounting and bookkeeping in one form or another distinguished themselves in active supervision of the most technical fabricating operations. I could go on like this for quite a spell, and I'll bet you could, too. All of this was done under compulsion, so to speak, on sort of an either-or-else basis.

Does this man possess unsuspected executive talent?

As far as the natural distribution of talent and ability goes, I don't think there is one iota of difference between the present day and that of the defense era, except in degree of urgency.

Let's Inventory Personnel—In the Lee Hobby Foundry we try to take an inventory each year, and I imagine most foundries do. Isn't it amazing how much valuable material is dragged out into the open from obscure hiding places, assets we didn't know we had, and junk, too? Wouldn't it be an interesting adventure to pretend that human assets were as valuable as the material kind and on that basis take a most careful inventory of the potential resources we may have covered up in the employees who ring in every day, including every single one of them.

To do this we'd have to lay our out-of-date organizational chart aside. We'd also have to disregard totally the lists we have made unconsciously of those folks we like, those who are just so-so and those we can't stand. Everyone would have to be under suspicion—under the suspicion that no matter how screwy they seem to be, they may have something we need. Above all, we'd

WHAT FOUNDRY MEN ARE SAYING

"Not one blow has been experienced with CO_2 hardened cores"

Cured a 5500 lb. mold in 40 minutes

Cures our cores perfectly in 20 seconds

Reduced our core room space by 2/3

Far fewer gaggers needed in molds

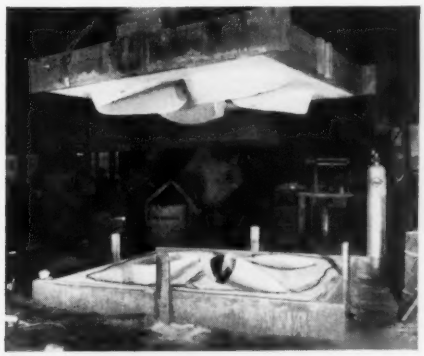
No danger of drops, soft spots or wet spots in molds

Eliminates 60% of our core handling

Molds may be left for several weeks without pouring

Over-all costs of making cores have been reduced by more than 50%"

FOR CORES
Liquid Carbonic CO_2 core curing set-up in operation at Pacific Brass Foundry, San Francisco, California.



FOR MOLDS
Fast, bakeless hardening of molds for large castings—like this one for 3400 pound nickel aluminum bronze propellers—is standard procedure at Columbian Bronze Corporation, Brooklyn, New York.

About the amazing CO_2 process for curing cores and molds

Learn why foundry men the world over are so enthusiastic over amazingly fast bakeless core and mold curing. CO_2 curing is as easy as it is inexpensive. Liquid Carbonic's free folder gives complete instructions. Or, if you prefer, a trained "Liquid" representative will call on you and conduct a demonstration. Just mail the coupon.

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THE LIQUID CARBONIC CORPORATION
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☐ Send me your free instruction booklet on CO_2 core curing.

☐ Have your representative call and give me demonstration of CO_2 core curing.

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ABRASIVE PROBLEM

Just dial NOrmandy 3-8529 in Ann Arbor, Michigan, and we will provide the answer. We have solved this problem and satisfied over 1000 new users last year with AMASTEEL. Here is an abrasive which is made in an electric arc furnace, it is a hypereutectoid steel, and fully heat-treated to a tempered martensitic microstructure. AMASTEEL is free from dirt and slag and other contaminations. It is screened to S.A.E. size specifications. AMASTEEL is predominantly round and solid, and is manufactured under quality control. Remember, the answer to your abrasive problem is as close as your

NOrmandy 3-8529

ALLOY METAL ABRASIVE CO.

ORIGINATORS OF CAST STEEL SHOT

123 S. DIVISION ST., ANN ARBOR, MICHIGAN

Branches in principal cities

have to recognize the time factor in such an inventory.

Unless I miss my guess, we hardly could get such an inventory under way before we would find ourselves experimenting with likely candidates by trying them out on jobs they don't know how to do. Some of them would fail, of course, but others might knock the props from under us, since we are only dub psychologists.

Of one thing I'd feel quite sure: If we did the job thoroughly, we'd uncover some pretty distinguished people in their off-the-job activities, with talents in wide contrast to those required to earn their daily bread.

We Might Hit Pay Dirt—Adventure capital is said to be the very foundation of our competitive enterprise system. Why not speculate a bit with a conservative investment of time and attention on test borings for the hidden resources in the people we have? We might hit pay dirt if we keep at it long enough. One thing is sure, to my way of thinking. If news got out among our employees of such a project, many of them would take a new lease on life, including their present work.

Oh well! I can dream, can't I?

Foundry Injury Rates Drop During 1956 Fourth Quarter

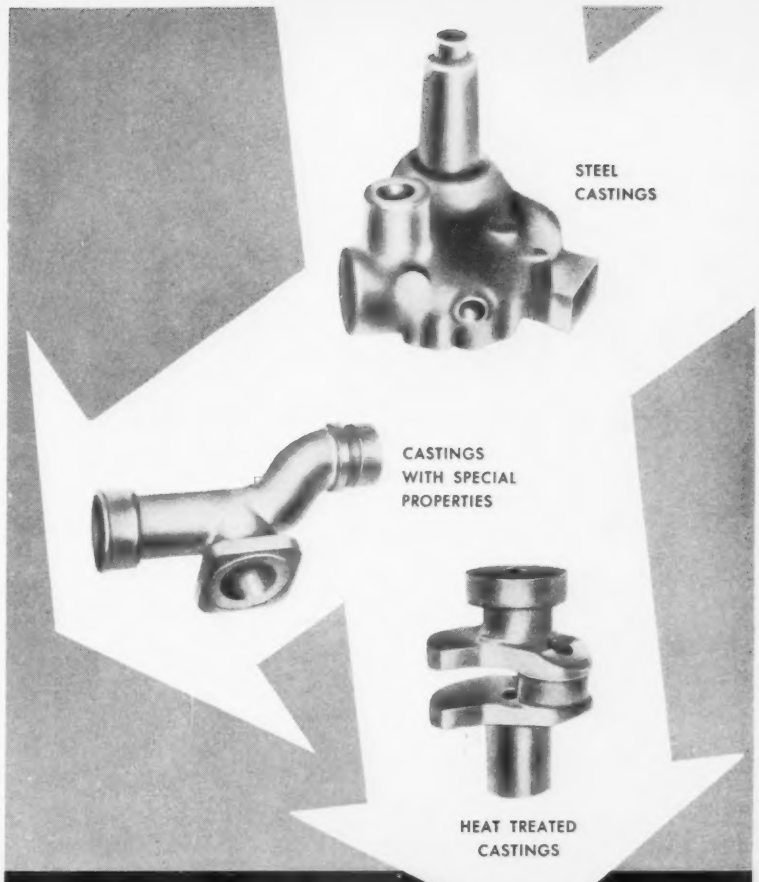
Foundry injury rates dropped during the fourth quarter of 1956, according to a recent report of U. S. Bureau of Labor Statistics. Injuries in gray iron, malleable iron, steel and nonferrous foundries were down the preceding period as well as below those of the fourth quarter a year ago.

The decreases were recorded in a period of expanding foundry employment and activity. During the 1956 fourth quarter the number of workers in foundries rose from 307,000 to 317,900 and hours worked rose from 41.2 to 41.6 per week. Over the year as a whole, however, only nonferrous foundries improved their safety record. Gray and malleable iron foundries showed no change, while steel foundries had an increased injury-frequency rate as compared with the previous year.

Foundry Injury-Frequency Rates* 1956

	1956		1955
Foundries	4th Qrt.	3rd Qrt.	4th Qrt.
Gray iron & malleable	25.4	29.1	27.5
Steel	22.0	25.8	22.8
Nonferrous	13.7	18.0	17.3

*Average number of disabling work injuries for each million employee-hours worked.



whatever you cast...

THOMPSON FOUNDRY MATERIALS

promote casting quality...and CUT COSTS!

● To obtain castings of superior quality in your day to day operation specify WARNER R. THOMPSON foundry materials . . .

CLAYS, BINDERS, SANDS, SAND ADDITIVES, KORWELD CORE PASTE, MASTERMIX WASHES and FOUNDRY EQUIPMENT

For over half a century Warner R. Thompson has been increasing foundry productivity and casting quality for foundry people you know.

YOUR LETTER OR PHONE CALL WILL RECEIVE PROMPT ATTENTION...TELEPHONE TYler 8-5362

"over 50 years of service to the Foundry Industry"

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Circle 800 on Inquiry Card—Page 51

behind
the
name
OSBORN....
OSBORN
SHAKEOUT
CONVEYOR
TURN
OVER

Experienced Application Knowledge makes sure you get the most out of automatic equipment

● "How can I apply automation to my production set-up?" Only men *long experienced* in improving foundry methods can give you sound application advice.

"Will I get all the production possible?" Again, Osborn's 50 years of *experience* in both short run and mass-production applications assures peak performance.

Have your operations analyzed by the men who have led the field in the use of automation . . . Osborn application engineers. Call or write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

. . . experienced application knowledge

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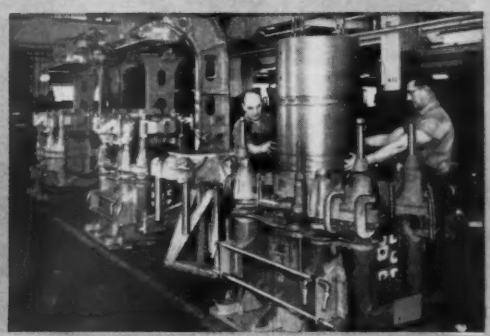
ADVANCED ENGINEERING—*Osborn engineering draws on 50 years of practical experience developing methods and designing machinery to increase your production . . . lower your costs.*



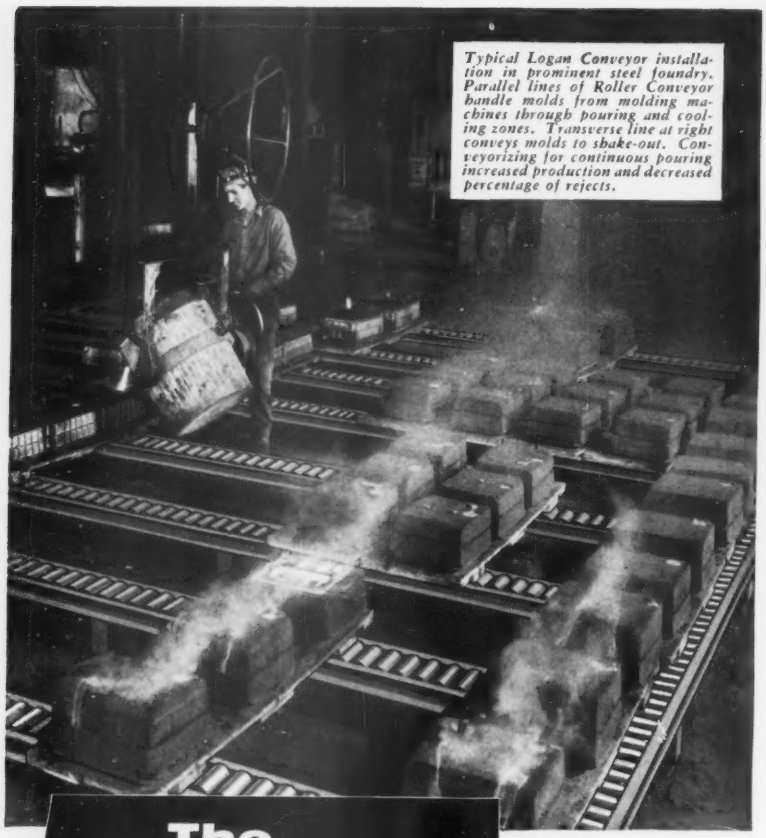
QUALITY MANUFACTURE—*Osborn craftsmen are experienced in manufacturing foundry machines that assure dependable performance . . . day after day.*

Leader in automation for the foundry

OSBORN®

MOLDING MACHINES • CORE BLOWERS
SHELL MACHINES • INDUSTRIAL BRUSHES
BRUSHING MACHINES

Circle 671 on Inquiry Card—Page 51



Typical Logan Conveyor installation in prominent steel foundry. Parallel lines of Roller Conveyor handle molds from molding machines through pouring and cooling zones. Transverse line at right conveys molds to shake-out. Conveyorizing for continuous pouring increased production and decreased percentage of rejects.

The LEADERS use Logan

. . . to keep things moving, in the modern industrial plant. Costly stops and starts are avoided—with correctly engineered Logan Conveyors. This famous equipment delivers materials and parts at convenient working heights, dispatches the product without manual effort to the next operation, puts flow into production. "Stay with the leaders—specify Logan Conveyors." Remember, they give you that something extra in engineering and design. Write for further information or for nearest engineer to call.

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

RADIO CORP. OF AMERICA R
SELBY SHOE CO.
SHAPLEIGH HDW.
SHARON STEEL CO. S
SHOWERS BROS.
A. G. SPAULDING & BROS.
STANDARD BRANDS, INC.
STANDARD OIL CO.
STANDARD STEEL SPRING
STAR CORRUGATED BOX
J. P. STEVENS & CO.
E. R. SQUIBB & SONS
SUNBEAM CORP.
SWEETS & CO.
SYLVANIA ELECTRIC
TENNESSEE EASTMAN
TERNSTEDT DIV. T
THERMOID RUBBER
THOMASTON MILLS
TRAVELER RADIO
UNION BAG AND PAPER
UNITED ENGR. & FDRY. U
U. S. GYPSUM CO.
U. S. RUBBER CO.
U. S. STEEL CO.
Conf'd.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Logan Conveyors

Improved Supervisor-Employee Relations Are Discussed

In a new booklet, "Improving Human Relations," the National Association of Manufacturers presents an action program designed to help top management develop better supervisor-employee relations in industrial plants. Practical steps are outlined to guide management in giving foremen and other supervisors the kind of training, education, and support they need.

Pointing out that the success of a company "rests heavily on how well the management group performs in achieving person-to-person understanding," the booklet emphasizes that the supervisor, as a member of management, must listen to employees and understand their needs and wants.

Copies, at 50c each, are available from the NAM Employee Relations Department, 2 East 48th St., New York 17.

Proposes American Standard To Govern Pallet Sizes

Reduction of pallet sizes from the hundreds now in general use to 10 standard sizes is suggested in a tentative draft for "Proposed American Standard Pallet Sizes," by a committee of widely known industrial and material handling specialists. A prolonged study of pallets was cosponsored by the Society of Industrial Packaging and Material Handling Engineers and the American Society of Mechanical Engineers, in accordance with procedures of the American Standards Association.

Single copies of the tentative draft are available through the Society of Industrial Packaging and Material Handling Engineers, 111 West Jackson Blvd., Chicago 4.

Iowa's Management Course Is Scheduled for June 10-22

The annual Management Course sponsored by the Engineering College of the State University of Iowa has been scheduled for June 10-22 at Iowa City, Iowa. The daily program will include three hours on communications, one to two hours on general lectures, and three hours on any one of the following optional subjects: Technical methods and management engineering, control methods for management, problems of production supervision, and analysis of work methods, motion, and time.

Circle 672 on Inquiry Card—Page 51

Circle 673 on Inquiry Card→

Save by using specialized refractories

Many refractories problems in metal-working furnaces have been solved *economically* by the use of B&W specialized refractory castables. Each ferrous or non-ferrous furnace application requires a specific combination of properties to meet the service conditions. Whether your problem is high temperatures, abrasion and erosion, slag attack or the need for insulation, to name a few, you will find the refractory castable best suited to your requirements in B&W's line. Shown here in digest form are data on the widely used B&W refractory castables for metal-working furnaces:

B&W Refractory Castables for Metal Working Furnaces

	Temp. F	PROPERTIES	TYPICAL APPLICATIONS
B&W Kaocast	3000	**High resistance to spalling and slag attack. Low volume change and negligible reheat shrinkage.**	**Soaking pit covers, linings of high temperature heating and forging furnaces, burner blocks, electrode linings of electric furnace roofs, linings of non-ferrous metal furnaces.**
B&W Kaocrete 32	3200	High strength, exceptional refractoriness, unusual volume stability, excellent resistance to spalling.	Can be used in applications similar to those of B&W Kaocast and where higher refractoriness is required.
B&W Kaocrete D	2500	**Sufficient strength and hardness to withstand abrasion, considerable physical abuse and erosion.**	**Aluminum melting furnaces, linings and car tops in heat treating furnaces, as well as in sections of a wide variety of furnaces that are subject to scraping by hand tools or other mechanical abuse.**
B&W Kaocrete A	2600	Resists reducing atmospheres. Has good resistance to erosion, abrasion and thermal shock.	Annealing furnace bases and other applications where resistance to reducing atmospheres is essential. Also as a general purpose castable for linings in medium temperature service.
B&W Kaocrete B	2300	**Has an adhesive plastic texture particularly suited for vertical or overhanging constructions. Excellent for plastering.**	**Patching linings and baffles and for any application where plastering rather than gunning or casting is required.**
B&W Kaocrete LI	2700	High alumina content, exceptionally high strength for resistance to abrasion and erosion.	Aluminum furnace linings where high alumina content is important.
B&W Kaolite 20	2000	**Offers castable's fast, low cost installation plus insulation. Has refractoriness, light weight and low heat conductivity and, in addition, will resist reducing atmospheres. Can be poured or gunned.**	**Aluminum melting, heating and heat-treating, annealing and forge furnaces. Also for general maintenance and patching.**
B&W Kaolite 22	2200	**Has the same properties as B&W Kaolite 20. Can be used for higher temperatures but not in reducing atmospheres.**	

Send for your copy of B&W Bulletin R-35. It gives additional information on B&W's versatile refractory castables.

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SFSA officers and directors at annual meeting include, left to right: C. R. Wyckoff Jr., W. H. Muchnic, B. P. Hammond, E. F. Marquardsen, H. F. Park Jr., K. M. Kincaid Jr., M. G. Moore Jr., R. A. Thompson and J. W. Perry Jr. Mr. Park, recently president, was named to a second term

Production and Marketing Subjects Highlight

Steel Founders' Society Meeting

By FRANK G. STEINEBACH
Editor

PROGRAM presented at the 55th annual meeting of the Steel Founders' Society of America, at the Drake Hotel, Chicago, March 18-19, was concerned chiefly with a review of progress and the consideration of future activities of the two major categories of the society. Discussion centered around the work which may be classified as technical and research or as market development..

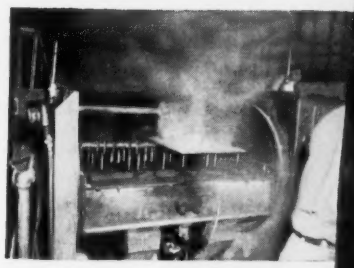
Howard F. Park Jr., vice president-sales, General Steel Castings Corp., Granite City, Ill., and president of the Steel Founders' Society of America, described some of the important activities of the society during the last year. He reported on the exceptionally well attended and successful technical and operating conference held in Cleveland last fall. Other activities of the technical and research program which he mentioned included the development of specifications for magnetic particle inspection and work on the development of specifications for raw materials, such as bentonite, corn flour, etc. During the last year two research reports were issued.

Mr. Park indicated that the Safety Committee took a long stride last June when it issued the society's safety manual to serve as a standard and guide for that important area of the industry. (FOUNDRY, December, 1956, p. 96.) The committee now is preparing a set of step-by-step procedures through which the manual's recommendations can be put into effect.

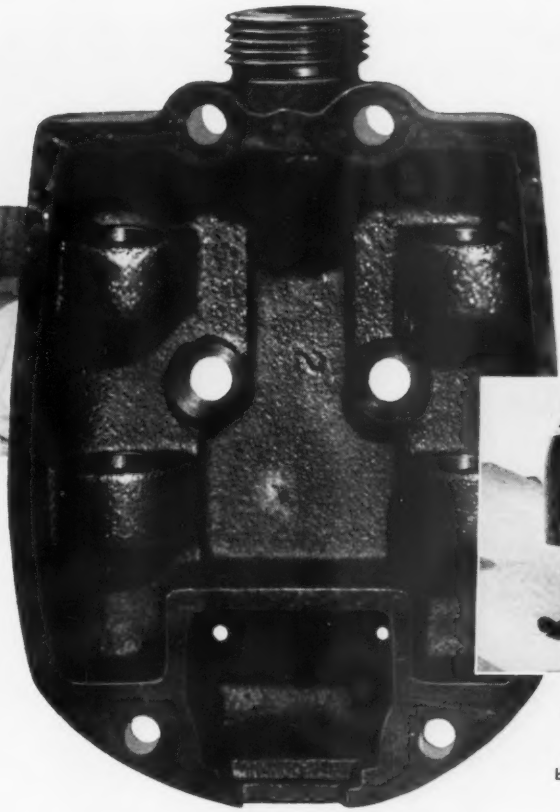
The market development program has been active and productive. The Advertising and Public Relations Committee has improved the format and content of these product design studies which apply directly to sales. The mailing list for the design studies was increased by about one-fourth during the year and now stands at approximately 36,000. That list will be increased. The committee made a good start last year on a program of regular contacts with faculty members of leading technical schools. The Product and Market Development Committee also has been planning to convert the rather small and sporadic program of market lectures

Clyde B. Jenni receives a certificate from H. F. Park Jr. in appreciation of work done at Washington as chief of the Castings Branch

finer castings from shell molds



Shell molds for front housing casting of SKIL Model 511 Jig Saw in production at Woodruff & Edwards, Inc., Elgin, Ill.



Front housing of SKIL Jig Saw is a grey iron casting having more uniform grain structure and better balance as a result of shell molding.

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Allen M. Schlichter, chairman, Market Research Committee, is awarded the Lorenz Memorial Gold Medal

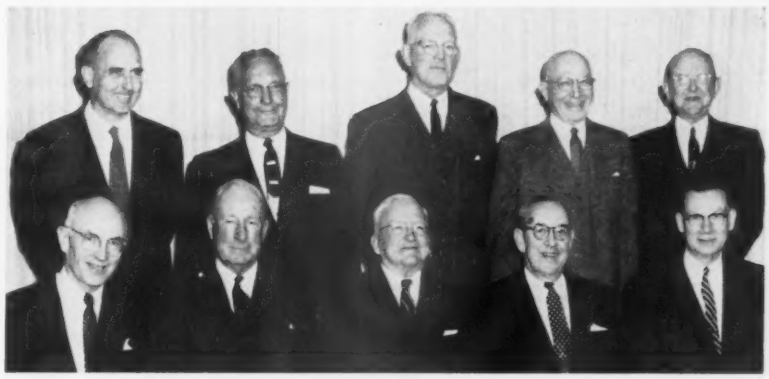
Henry D. Phillips, retiring chairman, Technical Research Committee, receives the T. and O. Gold Medal

into a full-fledged and thriving activity by building up a speakers' bureau.

One of the largest jobs accomplished by the society last year was the work of the Market Research Committee in the basic report entitled "Distribution of Steel Castings Sales by End Use of Product." This provides the foundation on which the entire market development program can be firmly built. The committee is planning to issue separate market research reports on specific industries during the year. The first will be out shortly and will cover "The Over-all Steel Castings Picture." It will be followed by others.

Mr. Park also reported that during the year the Cleveland staff prepared a substantial amount of data for inclusion in the government's "Report of the Heavy Steel Castings Task Group." These data included size and makeup of the foundry industry in the United States, location of companies, characteristics of steel castings, a comparison of steel castings vs. wrought steel, mechanical properties of cast steel and other information. The society also has been working through its executive vice president and Washington representatives in co-operation with other foundry associations in getting government to take a serious look at the scrap export situation.

A. J. McDonald, Washington representative of the society, outlined some of the work being done in the field of industrial preparedness by the BDSA and stressed the fact that now is the time for the industry to see that proper procedures and philosophies are established in the program. He reminded the members that during the Controlled Materials Plan, steel castings were listed as mill products and that ef-



These past presidents of the society were present at the Chicago meeting. Seated, left to right, are E. D. Flintermann, O. E. Mount, W. H. Worrilow, A. J. McDonald, F. Kermit Donaldson. Standing, left to right, are T. H. Shartle, H. A. Forsberg, T. H. Harvey, A. M. Andorn, and Frank M. Robbins

Officers and staff members of SFSA. Seated: H. F. Park Jr., president; B. P. Hammond, vice president. Standing: G. K. Dreher, market development director; C. W. Briggs, technical and research director; R. A. Willey, assistant technical and research director; F. Kermit Donaldson, executive vice president; Chauncey Belknap, legal counsel; Erwin Dieckmann, assistant secretary

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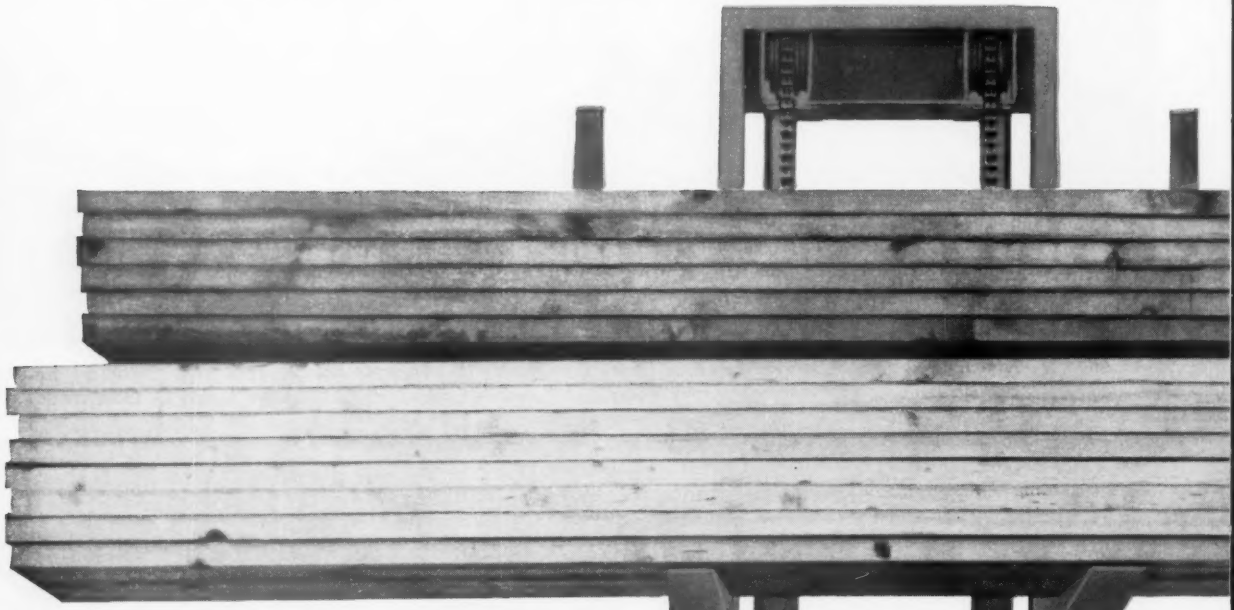

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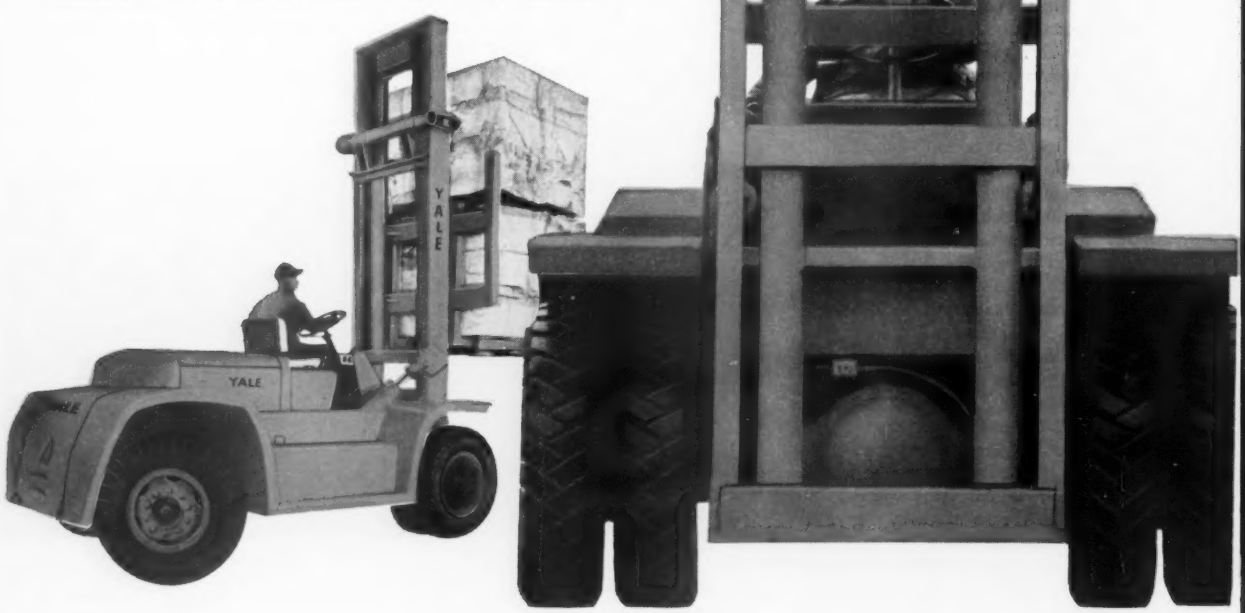

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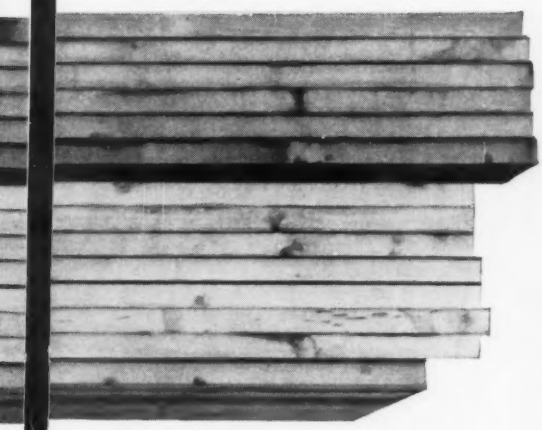

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- I-beam side members in frame for extra strength.
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I. M. Emery stresses the large industry investment in research

Roy A. Gezelius outlines market development work of the society

C. L. Harrell reviews recommendations of Appraisal Committee

Marion J. Allen emphasizes value of advertising, public relations

W. P. Dudley points to need for more attention to foundry safety

forts should be made now to correct this error. Mr. McDonald indicated that aircraft castings are becoming of greater importance and that the need for aircraft quality castings probably will develop before either government or industry is ready.

Speaking on "Steel Castings and Technical Research," H. D. Phillips, executive vice president, Adirondack Foundries & Steel Inc., Watervliet, N. Y., and chairman of the Technical Research Committee, traced the progress made during the last 30 years in technical research within the steel foundry industry. He pointed out that the industry has come a long way since 1927 because of research and stated that the society's technical research activities have been a powerful factor in this progress.

Today, the society is conducting studies on many different phases of foundry operation, the most important being the effect of design on hot tears, short cycle heat treating and molding refractories and binders. Although research activities are greater than ever before, Mr. Phillips believes that the industry is doing too little and is applying the findings too slowly. Since many avenues are open which will lead to better castings, a larger percentage of the sales dollar should be spent for research.

Mr. Phillips suggested the subject of design as a logical avenue for exploration. He pointed out that steel foundries have a material and method which is extremely adaptable to the production of just about any design, but that many present problems stem from the fact that steel castings still are being produced to designs better adapted to other types of metals. He stated that the board of directors recently approved continued studies to extend analysis of simple design sections to basic data for a quantitative design planning and to evaluate the factors for joined sections. Development of higher strength steels is another field of research, especially important when possible future needs of the Air Force are considered. In conclusion, Mr. Phillips urged the industry to make the future of the industry as it would have it through an expanded technical research program.

Advertising Aids Sales

Marion J. Allen, director of personnel and public relations, American Steel Foundries, Chicago, and chairman of the Advertising and Public Relations Committee, spoke on "What Does Advertising and Public Relations Mean to Our Industry?" He stated that advertising and public relations might be classified as company recognition involving matters of prestige, reputation, confidence in the company and awareness of its activities. Public relations is concerned with winning the acceptance of interested groups for the way the business lives and for its relation with employees, customers, suppliers, stockholders, educators and the community-at-large. Advertising is concerned with creating customer or consumer acceptance for the products or service sold by the company's salesmen. Sales departments can capitalize by assigning an important share of the sales task to advertising, and they will profit most if advertising is effectively integrated into the total sales plan.

Mr. Allen suggested that a company appraise its activities in the area of advertising and public relations by asking questions about such points as these: With what regard is the company's product held? What is the reception of the company's salesmen by customers? Are customers regularly informed of the company's progress? Is the company regarded as a good corporate citizen in the community? Is the company regarded highly enough in the community to get good local labor? Do company executives actively support civic, educational, social and fraternal organizations and activities? Other indications of good public relations relate to holding an openhouse to give the community

an awareness of what is being done in working conditions; informing employees about the over-all scope and activities of the company; and taking into account the best interests of the public in making any company move. The kind of company recognition wanted is that which puts the company in the best possible light with all those with whom it deals.

Industry Leaders Honored

Awards were presented at the luncheon on the first day. Henry D. Phillips, executive vice president, Adirondack Foundries & Steel Inc., Watervliet, N. Y., who is retiring as chairman of the Technical Research Committee after five years of service in that capacity, was awarded the Technical and Operating Gold Medal of the society.

Allen M. Schlichter, president, Pelton Steel Casting Co., Milwaukee, and chairman of the Market Research Committee, was awarded the Lorenz Memorial Gold Medal.

Dr. Edward Hucke, University of Michigan, Ann Arbor, Mich., won first prize and Norman Koch, metallurgist, Grede Foundries Inc., Milwaukee, won second prize in the Gustav A. Lillieqvist *Steel Foundry Facts* awards.

Clyde B. Jenni, General Steel Castings Corp., Eddystone, Pa., and Roger F. Waindle, vice president, Misco Corp., Chicago, Ill., were awarded certificates of appreciation for services rendered the industry during their service as chief, Castings Branch, Business and Defense Services Administration, Washington.

New members elected to the board of directors are as follows: B. P. Hammond, vice president, eastern castings sales, Blaw-Knox Co., Foundry and Mill Machinery Division, Pittsburgh; E. F. Marquardsen, vice president, and treasurer, Pacific Steel Casting Co., Berkeley, Calif.; John W. Perry Jr., vice president in charge of sales, Grede Foundries Inc., Milwaukee; C. R. Wyckoff Jr., president and secretary, Atlas Steel Casting Co., Buffalo.

H. F. Park Jr., vice president-sales, General Steel Castings Corp., Granite City, Ill., was re-elected president of the society. B. P. Hammond, vice president, Blaw-Knox Co., Pittsburgh, was elected vice president, and R. G. Parks, treasurer, National Malleable & Steel Castings Co., Cleveland, was re-elected treasurer. Staff officers were named as follows: F. Kermit Donaldson, executive vice president and secretary; Charles W. Briggs, technical and research director; George K. Dreher, market development director; Erwin

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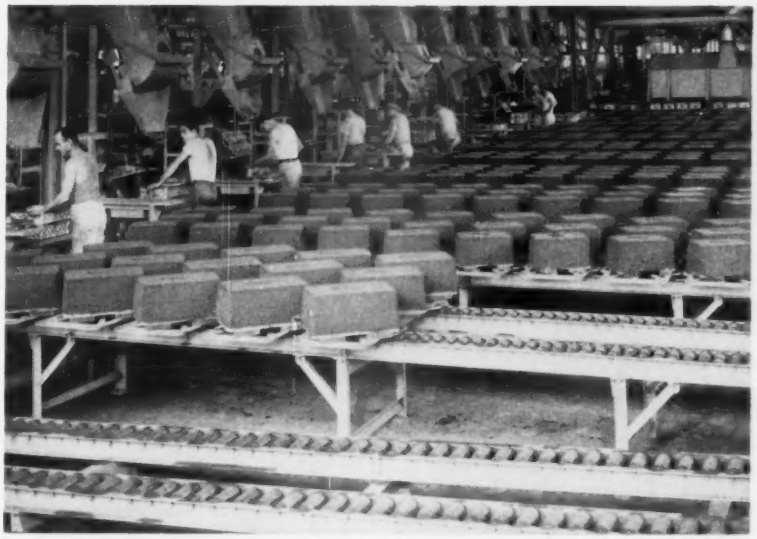

A typical roller conveyer system applied in a modern foundry producing castings for textile machinery.

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Dieckmann, assistant secretary.

In discussing "Foundry Education Through T&O Activities," I. M. Emery, president and general manager, Massillon Steel Castings Co., Massillon, O., and chairman of the Technical and Operating Committee, stressed the tremendous investment the industry had made in research during the last 12 years and in the technical and operating activities over a period of 20 years. To take advantage of this investment, Mr. Emery pointed out, each company should have representation at the T&O group meetings in its district and at the national conference. Key men should participate in T&O activities. Education received in T&O, in Mr. Emery's opinion, develops confidence in key men and also renews their assurance in the companies for which they are working.

The 1957 T&O conference will have several new features. The committee is asking member companies to submit papers on any technical or operating subject regarding the production of steel castings. A quality improvement program dealing with a sheave casting will be undertaken. Inquiries for this sheave casting have been mailed to members asking key men to submit designs, proposed risering and gating system, production methods, pattern construction, etc. Mr. Emery concluded by outlining the future potentials of the steel castings' market and indicated that these could be realized through application of the developments in T&O.

Accomplishments Outlined

Roy A. Gezelius, assistant vice president, General Steel Castings Corp., Eddystone, Pa., and chairman, Product and Market Development Committee, outlined the work done during the last two years to attain the objectives of the program—namely, the retention of present markets, the recapture of lost markets and the discovery and development of new markets. He pointed to the sponsorship of products development contests on a national scale, the holding of product development meetings in all divisions and the presentation of material which can be used to expand markets by convincing present and potential customers of the many desirable qualities inherent in steel castings. Mr. Gezelius stressed the fact that although progress has been made, more active interest at the company level is needed if the program is to gain further momentum.

The Product and Market Development Committee plans four regional conferences on product and market development during the coming year. One conference will include Divisions I, II, and IV and the other, Divisions V, VI, and VII. Because of geographical reasons, Divisions III and VIII will have individual divisional meetings. In conclusion Mr. Gezelius urged that each foundry sponsor a customer entry in the third product development contest, which will be concluded in June of this year.

Herman Stuetzer, partner, Lybrand, Ross Bros, & Montgomery, Boston, discussed "Depreciation for Tax Purposes!" Mr. Stuetzer considered the tax provisions of the Internal Revenue Code of 1954, which provides two new methods of tax depreciation, both of which provides substantial acceleration compared with the traditional straight-line writeoff . He indicated that the trend is not away from historical cost for depreciation, and that Washington thinks only of maintenance of present revenue.

Safety Needs Attention

W. P. Dudley, vice president-operations, Ohio Steel Foundry, Lima, O., presented an interesting discussion on need for greater attention to safety in the foundry industry. He pointed out that accidents are expensive and that unless the industry improves its safety record, costs will go up. The reason is that more and more things that can happen to a man are becoming compensable. Furthermore, if companies condone a bad safety record, those who desire to do so are given ammunition to put across social legislations. In conclusion, Mr. Dudley stressed the fact that management must take an active interest in the development and promotion of every phase of a safety program if lost ground is to be regained and the frequency rating of the industry reduced.

C. L. Harrell, president, Sterling Steel Casting Co., East St. Louis, Ill., and chairman of the Program Appraisal Committee, reviewed some of the recommendations of the Appraisal Committee and indicated the importance of giving these further consideration.

J. Lewis Powell, member of the staff of the Assistant Secretary of Defense (Supply and Logistics), Washington, speaking on the "Production Allocations Plan," stressed the "Collapse of Time" as the principal ingredient in man's technological progress. He illustrated this with a graphic blackboard presentation of a curve showing man's continued painstaking progress from 1830 until 1945. From 1945 until now, progress has been by leaps and bounds.

Mr. Powell stressed how, in 1945,

we revolutionized our thinking. We made "Progress a Product" which could be achieved deliberately by the application of mobilized brainpower. In succession he contrasted progress in speed, explosives, and the range of missiles against the blackboard graph. In each instance, the blackboard graph spectacularly illustrated that the avalanche of technology had created more progress in the last 20 years than in the previous 2000 years.

Mr. Powell pointed out that this avalanche of technological progress has also created an avalanche of obsolescense. He stressed that national security could not rest as firmly as it once did on stockpiled munitions and weapons, since today's electronic wonders—like today's newspapers—would be obsolete tomorrow.

Mr. Powell concluded by stating that a well-informed military-industry team-in-being is essential to continued national defense.

A warmup for the Tuesday morning session was the showing of a film, "The Big Difference," produced by the Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

Booklet Presents Papers Given At pH Measurement Symposium

"Symposium on pH Measurement" is a booklet covering a symposium at the annual meeting of the American Society for Testing Materials, June 19, 1956. Nonaqueous solutions, refined methods of instrumentation, standardization of measurements, performance studies and new develments in pH instrumentation are among the subjects discussed.

The booklet is available from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price to members is $1.85; to nonmembers, $2.50.

Book Review

The Final Forming and Shaping of Wrought Non-Ferrous Metals, cloth, 126 pages, 8½ x 10½ in., published by the Institute of Metals, 17 Belgrave Square, London, S.W. 1, England. Price $3.50.

Monograph contains eight papers given at a symposium at the annual general meeting of the Institute of Metals in London, Apr. 12, 1956. Papers discuss the machining properties of nonferrous metals, deep drawing and spinning of sheet metal, rubber pressing, research into some metalforming and shaping operations, cold roll-forming and manipulation of light gage sections, bending and allied forming operations and hot forming of magnesium alloys.

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No clutching, no shifting

You get a high rate of production with every attachment, because the R-15 travels up to 12 m.p.h., forward and reverse — climbs 25% ramps with 2,000-lb. hopper load. Turning radius is short, only 82 inches with hopper or platform — 84 inches with fork lift. *There's no clutching or shifting.* All travel is controlled by foot accelerator. A simple *power-flow* transmission *automatically* regulates power output in direct ratio to power and speed requirements. Find out what low-cost Moto-Bug can do for *you.* Ask Kwik-Mix distributor to demonstrate — or write us *today.*

Change R-15 Moto-Bug from hopper body to 4½-foot platform, and you have a heavy-duty, 1-ton truck. It also has 780-lb. drawbar pull for towing wagons, carts.

Low-cost fork lift attachment for R-15 Moto-Bug has 1500-lb. capacity (at 15-in. load center), 7-ft. lift, power-tilt mast, adjustable forks. A smaller size Moto-Bug is also available with multiple tools.

mail to: KWIK-MIX COMPANY PORT WASHINGTON, WIS. *Division of Koehring Co.*

Send us literature on R-15 Moto-Bug with: ☐ hopper ☐ platform ☐ fork lift

NAME_____ TITLE_____

COMPANY_____ DIV._____

STREET_____

CITY_____ STATE_____

☐ Also interested in smaller multiple-tool 5-10 Moto-Bug. KM774 FO

Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Philadelphia . . . Boston

Pittsburgh—Mill equipment builders continue to enjoy strong demand for their products, although many smaller foundries say their sales are moderate. Foundries supplying automotive castings report customers' inventories are high and they are slow in placing orders.

Among the mill equipment group, United Engineering & Foundry Co. has a $114.2 million backlog of unfilled orders, an increase of 49.5 per cent from the level one year ago. United expects to work at capacity through this year.

A Baltimore firm, Ellicott Machine Corp., has acquired control of McConway & Torley Corp., an 88-year-old Pittsburgh foundry. The acquisition was a $3-million stock purchase. McConway & Torley and its wholly-owned subsidiary, Baltimore Foundry & Machine Corp., Baltimore, will maintain its corporate name and will operate as a subsidiary of Ellicott.

Patterson Foundry & Machine Co., East Liverpool, O., reports that it has renovated its sales organization. Raymond H. Jebens was appointed manager of customer application research. His department will have responsibility for product research and development in addition to customer applications.

Philadelphia—Backlogs of heavier gray iron and steel castings are larger than in light work. May melt will approximate that of April but is somewhat under last year, with some shops operating four-day schedules.

Consumer inventories of light castings are being worked down and an increasing number of new orders stress prompt shipments; backlogs being thin, most shops are in position to meet delivery. Steel foundries are operating at a substantially higher level than gray iron and malleable shops.

Foundry costs are higher, although the $2 increase in pig iron is about balanced by easier cast scrap prices. Nonferrous shops are dragging, with slack in housing indicating slight, if any, improvement in May.

Pump and valve volume is more encouraging, notably for shipbuilding and power plant expansions. Gray iron shops look for pickup with depletion of inventories; most users of light castings have been drawing on stocks for weeks and have about reached the point in many cases where more new orders are ahead.

Boston—Slight improvement in demand for light gray iron castings reflects further curtailment in consumer inventories. Some shops will increase their melt slightly in May. Machine tool orders have been sliding off, but not alarmingly.

Foundries are having more difficulty than most branches of metalworking in passing on higher costs. In part this is because of competition, notably among captive mechanized shops which have increased capacity substantially in recent years. Lacking orders for normal tonnage to fill this increase, they are taking in contract work at prices many jobbing shops cannot meet profitably.

Foundries supplying heavier electrical equipment requirements are melting at a higher rate. Pig iron prices are up $1.50 per ton for second quarter; but the increase by Mystic Iron Works, holding contracts with approximately 250 area shops, was less than expected. Cast scrap prices are lower, but the decline is not as sharp as in steel scrap. Actually the spread between iron and scrap prices has not changed enough to revise ratio in melt mixtures.

Chicago—Industry in five rapidly growing suburbs in Skokie Valley adjacent to Chicago on the north recognizes its relationship to education and does something practical about it. On March 15 the Skokie Valley Industrial Association, composed of manufacturers in Skokie, Morton Grove, Lincolnwood, Niles and Northbrook, Ill., conducted its second biennial Industry-Education Day.

On that day, classes in Niles Township public and parochial schools were dismissed and 579 teachers visited one of 33 industries of their choice. A company took as many teachers as it could handle—groups which ranged from 5 to 50. The schools made the assignments after the teachers had previously indicated their preferences and the respective companies had sent personal letters of invitation.

The day's program started at 8:30 a.m. when the teachers and representatives of industry convened in the high school gymnasium to be welcomed by the president of the Industrial Association and to hear a speaker discuss "Industry's Place in the Future."

The teachers were transported to the individual plants for 10 o'clock arrival. There they met company officials and were briefed on what they would see during their visit. The plant tours ran from 10:30 until noon, when the teachers were luncheon guests.

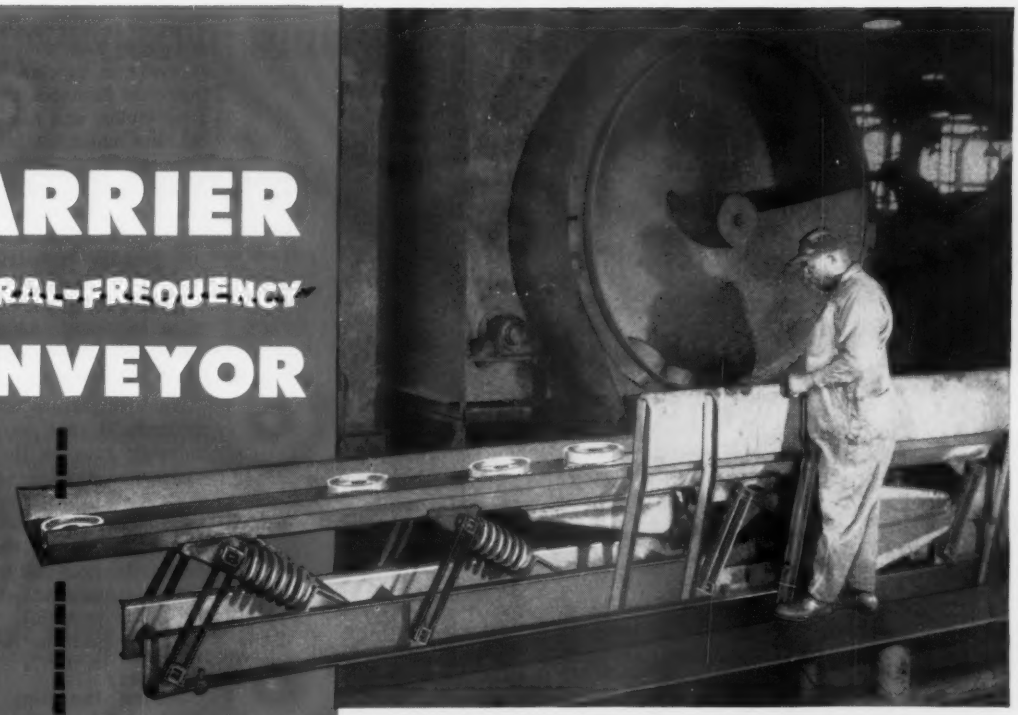
Gene Denning, executive secretary of the Skokie Valley Industrial Association, comments that luncheon is an ideal time for teachers and their hosts to get better acquainted and to exchange ideas.

In the afternoon a conference session of up to 90 minutes was held during which company executives explained employment practices, employee relations, public relations, manufacturing procedures, merchandising, distribution and sales. Questions and free discussions were encouraged. Upon adjournment, teachers were transported back to the high school.

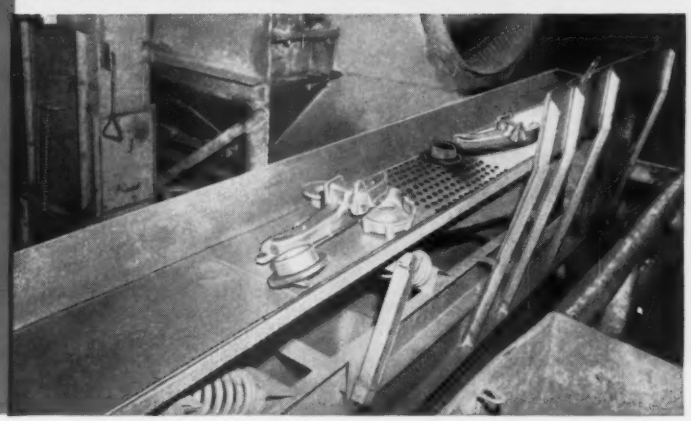
The Association recognizes the important influence of the teaching profession upon the future of industry and believes its Industry-Education Day program can provide a basis for the exchange of ideas which will be of mutual benefit. It feels, too, that by becoming better acquainted with industry the teachers later will tell their students about the opportunities to live and work in their local community. Teachers spread the influence still further when they report on their industry visits at their respective PTA meetings.

Among the 33 plants which opened their doors to teachers on March 15, one was a foundry. This was Wells

CARRIER
NATURAL-FREQUENCY
CONVEYOR



TAKES HEAT, IMPACT AND ABRASION IN STRIDE!



HERE you see a 15′ Carrier Natural-Frequency Conveyor at work underneath a Pangborn Rotoblast "Continuous-Flo" Barrel in International Harvester's Indianapolis plant. It puts in a rugged 16-hour day conveying 320 tons of hot gray-iron castings, including heavy water-pump housings, flywheels, retaining rings and other engine parts.

Foundry applications are only one of the many uses for Carrier Conveyors. Others include bulk chemicals, cement, ores, mill scale and slag, food products and machine turnings — all of which are now being successfully conveyed and processed by Carrier Natural-Frequency Vibrating Equipment. Write for Bulletin 112. Carrier Conveyor Corporation, 253 North Jackson Street, Louisville 2, Kentucky.

CARRIER CONVEYOR ABOVE HAS FOUR BIG ADVANTAGES OVER PREVIOUS METHOD:

1 Vibration of unit accomplishes far better job of shot removal.

2 Instead of bunching up, castings now move quickly and evenly down conveyor, for easier sorting.

3 Heavy steel-plate trough resists impact, heat and abrasion, making maintenance costs negligible compared to a belt.

4 Patented Carrier Natural-Frequency drive uses heavy coil springs as drive units. Result — low input horsepower, uniformly distributed operating stresses, and a *minimum of mechanical maintenance.*

CARRIER CONVEYOR CORPORATION, LOUISVILLE 2, KENTUCKY

what's in a name?

To these proud parents there's only one "Johnny"!

In the field of metal abrasives, there's only one "MALLEABRASIVE", and that's our baby!

"MALLEABRASIVE" is the name of the world's first malleablized abrasive, researched and developed by Globe and famous Battelle Memorial Institute.

No other metal abrasive is the same because only Globe uses the complete process which gives Malleabrasive its own distinctive metallurgical structure.

What's in a name? Just this — the name MALLEABRASIVE represents a standard of excellence that prompts Malleabrasive users to ask, "Is it as good as Malleabrasive?" when urged to buy something similar.

Sold by Pangborn Corporation, and by leading distributors of foundry supplies from coast to coast.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO ®

1907—Fiftieth Anniversary—1957

Mfg. Co., Skokie, Ill., which makes gray iron and alloyed iron castings. It melts in cupolas, electric arc and induction furnaces, casts in sand and shell molds, and has complete physical and chemical laboratories. This company was host to nine teachers —five women and four men. The group was interested to hear of the advantages of advanced education to the foundry industry and to learn particularly how the Foundry Educational Foundation program functions to train university graduates for technical and management service in the industry.

Another feature of the association program is that on alternate years industry goes to the schools. On a designated day representatives of industry visit the schools, hear educators explain their programs and they even attend classes with students. In this way, industry gets better acquainted with the schools and their problems. This makes the whole program a two-way street.

* * *

During the first two weeks of April, International Harvester Co. initiated a company-wide program of employee co-operation in promoting the sale of the products it manufactures. During the April 1-15 peried when March bills normally were paid, employees were asked to sign and attach a little printed message to their payments to local businesses.

The message expressed appreciation of the business establishment's service and courtesy. It noted the products Harvester makes — motor trucks and farm and construction equipment—"have enabled thousands of businesses to give better service to their customers." And it suggested that Harvester products be considered if the business makes purchases in the future.

Purposes of the message, it was pointed out to employees, was to express the employee's thanks to firms with whom he does business, to identify the employee with Harvester, to more widely identify and publicize types of Harvester products, to ask consideration in purchases of such products by business, and to make all business firms in the community more aware of the economic contribution made by the company to a community through the money spent by Harvester people.

Response of employees to the company's suggestion was overwhelming. Requests quickly exhausted the original printing of 500,000 cards and a supplemental order of double that number was rushed through so that all employees could be supplied with the number of cards requested.

Circle 683 on Inquiry Card—Page 51

End jar-caused maintenance with TABOR-SHOCKLESS FULL-POWER JOLT

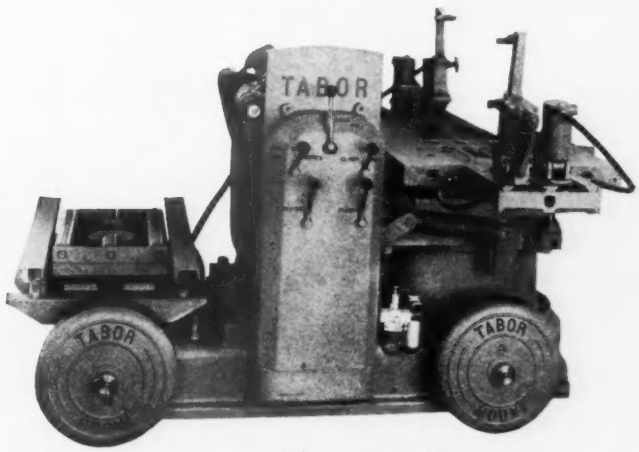
Earthquake shocks that used to be a necessary evil in foundry (particularly core-room) operation can now be avoided without loss of full-power jolt. It's the Tabor-shockless principle that does the trick.

The Tabor Power-Rollover, Power-Draw Machine shown here gives full ramming effect on the sand . . . with shock divided between the falling table and the rising anvil. Reduces costly maintenance on the machine itself, and on surrounding equipment.

If you want all your equipment to last longer, work better, find out about the Tabor-shockless principle today. Write for Tabor literature or ask to see the Tabor man — the technical man.

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

PROOF!
that a full-power jolt can be completely shockless. A quarter placed on edge on the base of a Tabor-Shockless Machine remains standing even after full-power jolt.



Tabor Power-Rollover, Power-Draw Machine with completely shockless full-power jolt.

TM

THE TABOR MAN
IS A TECHNICAL MAN

TM

TABOR

American Lithium Institute Launches Research Program

American Lithium Institute has initiated a program of sponsored research on lithium alloys at Massachusetts Institute of Technology and on lithium-containing glass at Pennsylvania State University. The institute will establish fellowships at the two schools.

At MIT, Prof. Michael B. Bever, department of metallurgy, will supervise a fundamental study of lithium alloys to broaden the basic information on known lithium alloys and to develop data on unknown lithium alloy systems needed in evaluating their potentialities as new construction materials. At Penn State, Dr. W. A. Weyl, college of mineral industries, will direct a contract-research program to determine behavior of the lithium ion in glass.

Member companies of the American Lithium Institute Inc. are American Potash & Chemical Corp., Foote Mineral Co. and Lithium Corp. of America.

POWER SPINNING of heads gives strength and rigidity to parts . . . keeps weight and bulk at a minimum.

ALL WELDED sheet steel construction provides the extra durability that means longer life . . . lower maintenance.

SPENCER Blowers

perform better because they're *made* better

Operation of any blower can only be as good as the workmanship that goes into making it.

That's why, step by step in the manufacture of SPENCER blowers—from the careful rolling of sheet steel to form casings . . . to the final painting with lead-base paint and then enamel—no effort is spared to produce the most reliable, sturdily constructed blowers on the market.

Spencer recognizes that *there are no short cuts to quality*. That's why SPENCER blowers have been preferred for forty years by leading furnace and other equipment manufacturers.

SPENCER Blowers are available in these capacities:

H.P.—1/3 to 1,000
CFM—Up to 20,000
Pressure—4 oz. to 10 lbs.

Request Catalog 126-A containing complete specifications.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

OTHER QUALITY SPENCER PRODUCTS

STATIONARY VACUUM SYSTEMS

PORTABLE VACUUM CLEANERS

PNEUMATIC CONVEYING SYSTEMS

Study Reveals Illness Costs Workers 13 Per Cent of Income

Prolonged illness and absence from the job costs employees in industry 13 per cent of the annual income. Almost $2 billion in production time is lost annually from this cause. These and other interesting facts were disclosed by the recent publication of results of a five-year study of nonoccupational illness by the Research Council for Economic Security, Chicago.

Rate of absence, duration, and severity of prolonged illness; medical data on types of illness; functioning of company medical departments; efficiency of group insurance; medical care needed by workers studied; costs to industry; costs to individuals; cost to the nation and rates of absenteeism by industries, age, sex, regions and jobs are covered extensively in the study.

The publication, "Prolonged Illness-Absenteeism," may be obtained from the Research Council for Economic Security, 111 West Jackson Blvd., Chicago 4, Ill. Price is $10.

Norton Co. Wins Safety Awards

Grinding Machine Division, Norton Co., Worcester, Mass. recently won two top industrial safety awards. James M. Lawson, general foreman and chairman of the division's plant safety committee, accepted the Massachusetts Safety Council's award for the best safety record in the heavy machinery group. Ceremonies were held in Hotel Statler, Boston.

Safety engineer Nelson P. Ingalls was notified that the division also had earned the Award of Honor tendered by the National Safety Council, Chicago, for its outstanding safety record. The division won both of these awards last year also.

Book Review

Industrial Vision by Henry W. Hofstetter, 187 pages, 6 x 9 in.., published by Chilton Co., Chestnut & 56th Sts., Philadelphia 39, Pa. Price $10.

Covering the whole field of industrial eye hazards and protection, this book includes the relation of vision, visual testing and visual skills to industrial performance, production and safety. Also given are industrial eye hazards and protective programs, methods of evaluation of efficiency for compensation purposes and vision in relation to automoile and truck driving.

Circle 685 on Inquiry Card—Page 51

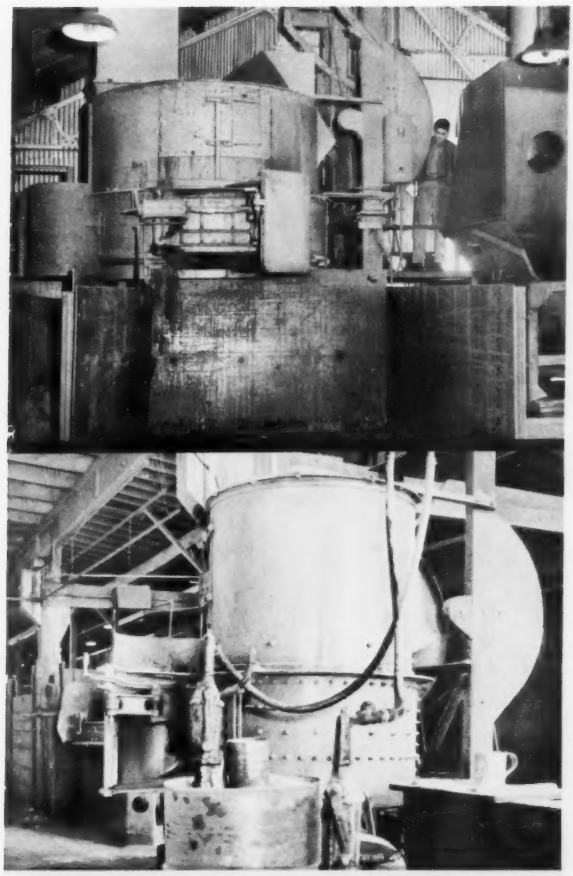
Circle 686 on Inquiry Card→

outstanding

in Cincinnati...

✔ The first engineered castings show

✔ Mechanization in Cincinnati area foundries with B&P MACHINERY

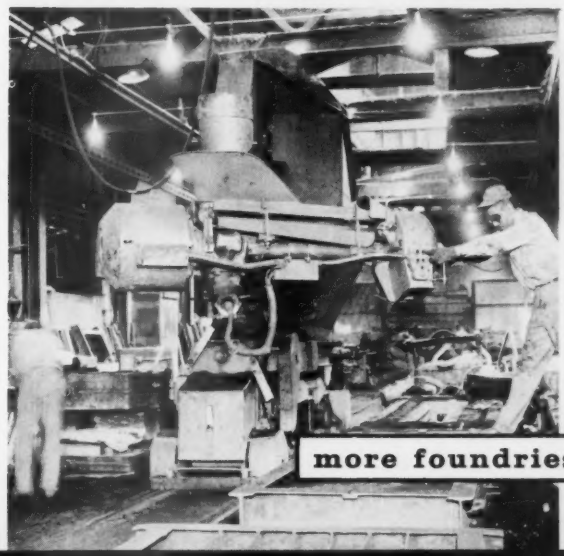


SPEEDMULLOR MULLING FOR MOLDING AND CORE SAND AT HAMILTON FOUNDRY & MACHINE—The Hamilton Foundry & Machine Company plant at Hamilton, Ohio, has a melting capacity of up to 25 tons per hour, and its customers are located throughout a wide area. This foundry must have quality and dependability. An "80-80" Speedmullor-Preparator Unit prepares molding sand for two of its units while two smaller Speedmullors handle core sand production. Results are high quality and low costs all along the line.

The eyes of the foundry industry are on Cincinnati for the First Engineered Castings Show ever held. Cincinnati has long been a leader in foundry mechanization and a few of the progressive foundries of that area that have mechanized with B&P machinery are shown here. An entire range of foundries from the smallest to the largest in this area use Speedmullors, Speedmullor-Preparator Units, Stationary Slingers, Motive Slingers, Flexiblo Core Blowers, and other B&P machinery to gain the advantages of mechanized operation. Many different approaches to the problem have been employed, but the result is the same in each case—a higher quality product produced at lower cost.

Ask for your copy of the
CONVENTION ISSUE OF BETTER METHODS MAGAZINE
featuring the Peerless Foundry of Cincinnati

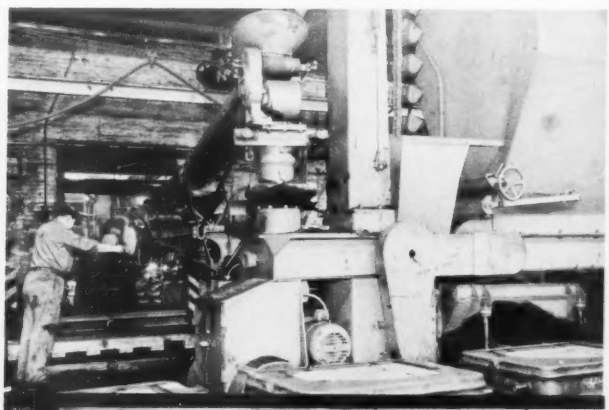
90% OF TOTAL OUTPUT FROM MOTIVE SLINGER AT CHRIS ERHART—The 103-year-old Chris Erhart Foundry at Cincinnati is employing modern methods to produce a wide range of machine tool, pressure and other quality gray iron castings. Their Motive Slinger, purchased in 1946, has handled over 90% of their molding work ever since. The work is of a strictly jobbing nature with the majority of patterns of wooden construction.



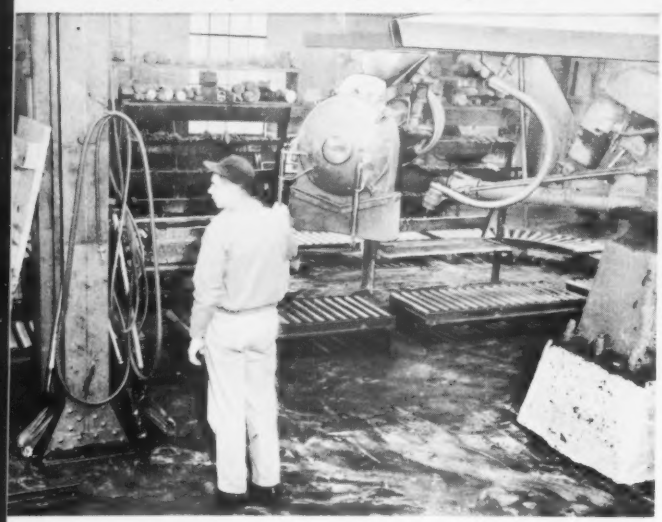
more foundries

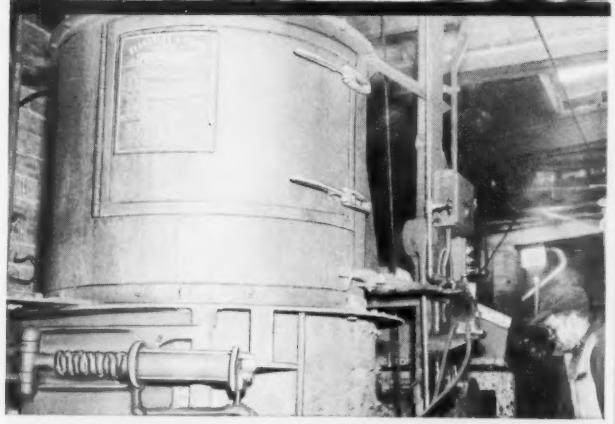
SLINGER RAMMING AND SPEEDMULLOR MULLING MEAN EFFICIENT OPERATION AT BLACK-CLAWSON—The big Black-Clawson foundry at Hamilton produces a wide range of large jobbing castings for paper mill machinery. A variety of miscellaneous castings are also sold to jobbing customers. The bulk of their molding is handled by a Motive Sandslinger. This slinger rams both pit and flask work with the biggest casting produced in the 45,000 lb. range. A Stationary Sandslinger and Speedmullor-Preparator Unit also do a big job at Black-Clawson's Keuthan Foundry Div. at Middletown, Ohio, and a Speedmullor-Preparator Unit and Motive Speedslinger handle the work at the company's Bagley & Sewell Div. at Watertown, N.Y.

outstanding



CONVEYORIZED SLINGER MOLDING AT HAMILTON FOUNDRY & MACHINE—This compact Stationary Sandslinger installation handles a large portion of this foundry's medium size work. Flasks are rammed both on the conveyor and on the floor in the foreground. Rammed molds are moved by conveyor to finishing and storage area.



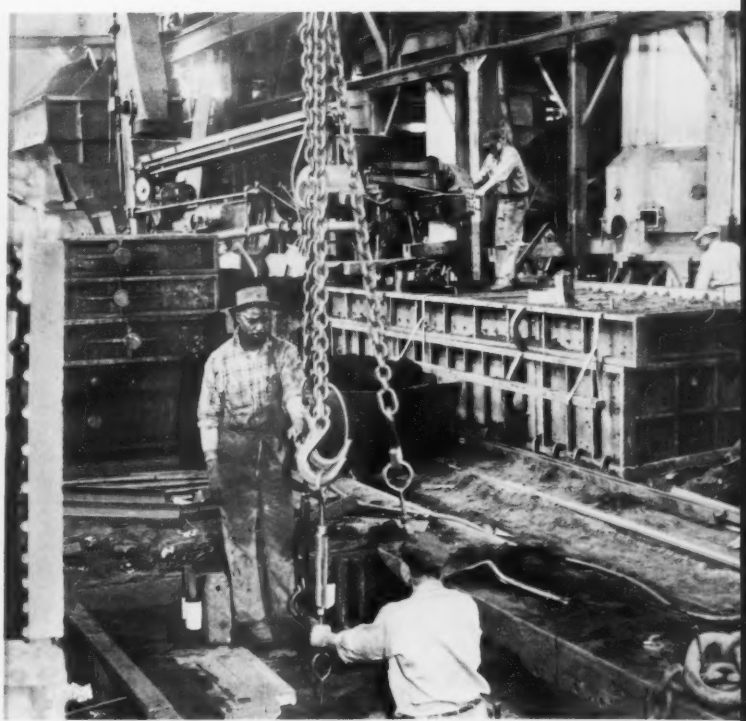


THREE SPEEDMULLORS AND A SLINGER REALLY PRODUCE AT DEUSCHER—The jobbing foundry of H. P. Deuscher Company at Hamilton, Ohio, is an important supplier to the machine tool, baking machinery and other plants in the area. Molds for complex castings weighing up to a ton are rammed by a Motive Sandslinger, which accounts for a large share of Deuscher's production. All of this shop's mulled sand is prepared by Speedmullor and Speedmullor-Preparator Units. Two Mullor-Preparator Units handle all of the molding sand, while a single Speedmullor processes all of the closely-controlled core sand.

AREA'S NON-FERROUS FOUNDRIES DEPEND ON SPEEDMULLORS—The progressive plant of Hamilton Brass & Aluminum Company is one of the outstanding non-ferrous foundries of the area. A great range of jobbing castings weighing from a few ounces to a thousand pounds are produced. The heart of the operation is a Model "40" Speedmullor (left) that prepares all of the foundry's synthetic molding sand. With Speedmullor control, a single sand is used for all of the molding. Mulling time is 60 seconds and the batch size is 500 lbs. The Reliable Castings Corporation of Cincinnati also depends on a Speedmullor (right) for all of their molding sand preparation. Reliable, one of the leading non-ferrous shops of the area, ships up to five tons of bronze and aluminum castings daily. Their "60" Speedmullor thoroughly prepares 80 to 100 tons of sand daily. The sand is mulled in 1,000 lb. batches and the mulling cycle is 60 seconds.

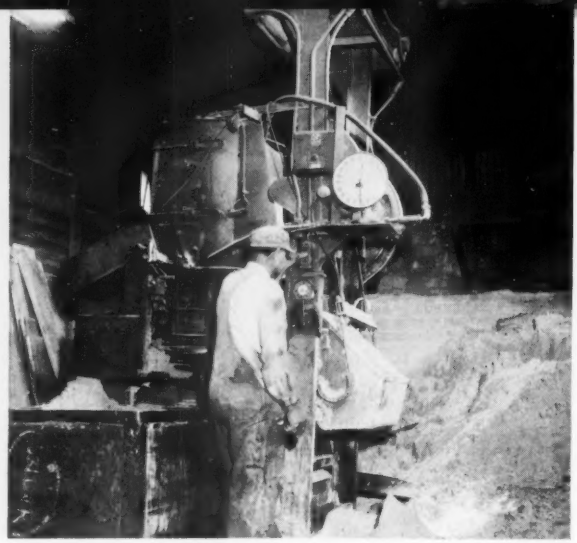
in Cincinnati...

SLINGER RAMMING PROVIDES FLEXIBILITY FOR ALL PIT AND FLASK MOLDING AT OBERHELMAN-RITTER—Up to 96% of the casting output at the progressive Oberhelman-Ritter Foundry is slinger rammed. This big shop ships up to 25 tons a day so the single Motive Sandslinger has to do a big job. The largest castings weigh up to 50,000 lbs. The pit mold in the foreground for a 40,000 lb. lathe bed has just been rammed and, in the background, the slinger rams the cope for an 18,000 lb. boring mill housing.



still more foundries ▶

A PORTABLE "30" SPEEDMULLOR MIXES ALL OF OBERHELMAN-RITTER'S CORE SAND—This Speedmullor is actually portable. There are no foundations—a lift truck moves it into position for maximum operational convenience. Its job is to prepare all of this foundry's oil bonded core sand. This exactly-controlled sand is thoroughly mulled in 4 cu. ft. batches in 90-second mulling cycles.

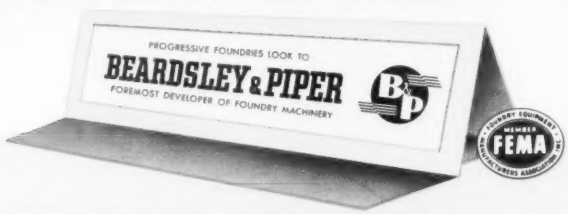


outstanding in Cincinnati!

SAND PREPARATION AND MOLDING . . . JOBS FOR B&P MACHINERY AT STANDARD CASTINGS OF CINCINNATI, INC. Standard Castings of Cincinnati is another of the area's leading gray iron jobbing foundries. This Stationary Slinger handles over 75% of the foundry's molding and approximately 20 tons are shipped from the plant daily. A wide range of complex wooden patterns for machine tool, baking machinery, printing machinery, and other castings are rammed. A Speedmullor-Preparator Unit prepares all of the molding sand. This big job is done with typical Speedmullor control and speed.

PRECISE CONTROL OF SYNTHETIC MOLDING SAND IN 45-SECOND SPEEDMULLOR CYCLE AT CHRIS ERHART—This Model "40" Speedmullor does a big job at the jobbing foundry of Chris Erhart. Its job is to prepare synthetic molding sand for Erhart's slinger. A 45-second mulling cycle in the Speedmullor does the job nicely. Moisture is held at 4.4% while a green strength of 14.5 p.s.i., and a permeability of 80 are obtained.

Write now for your free copy of
BETTER METHODS CONVENTION ISSUE
featuring the Peerless Foundry of Cincinnati



BEARDSLEY AND PIPER
DIV. PETTIBONE MULLIKEN CORP.
2424 N. Cicero Avenue, Chicago 39, Ill.

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

FIRST of a series of reports describing investigations into correlation of the radiographic appearance of discontinuities with mechanical properties in light alloy castings is available from the Office of Technical Services, Department of Commerce, Washington 25. Effect of hydrogen gas porosity on the tensile properties of 195 alloy casting material was studied. Metallographic illustrations of elongated hydrogen gas porosity in the test material provided the bases required for correlation with derived tensile properties.

Radiographic classification followed to obtain reliable grade assignments is described. Quantitative determinations of damage by hydrogen porosity to ultimate strength, yield strength and elongation were obtained and discussed. The report is entitled "Mechanical Properties of Porosity-graded 195 Alloy," and is designated PB 121546. Price is $1.25.

Shrinkage Remedies

REPORT on "Shrinkage Defects in K-bar Test Castings" by J. Gittus appearing in the February, 1957, issue of the *B.C.I.R.A. Journal of Research and Development* (Birmingham, England) gives the following conclusions:

Green-sand-molded K-bars produced under conditions approximating those obtained in a commercial foundry contained surface defects whose average volume was generally reduced by—a) Lowering the maximum temperature attained by the furnace. b) Reducing the melting time. c) Raising the pouring temperature. d) Raising the carbon content. e) Lowering the silicon content. f) Raising the manganese content. g) Raising the sulphur content. h) Raising the phosphorus content. i) Lowering the shatter index of the sand.

Since alterations in the levels of those variables can cause troubles other than shrinkage defects, the practical application of the observations should be a matter for some caution. Internal porosity is most pronounced in K-bars of high phosphorus and low carbon contents, especially when the metal has been inoculated by a ladle addition of ferrosilicon. Superheating the metal in the furnace reduces porosity in the resulting castings. CO_2 process molds produce castings which contain less shrinkage and porosity than do similar castings made in green sand molds. Shrinkage and porosity in K-bars of various compositions are not influenced by wide variations in the oxygen content of the metal.

Hot Tearing in Steel

APPARATUS has been developed to assess the phenomena of hot tearing in steel castings quantitatively in terms of tearing temperatures and stresses. It also permits dependable, accurate comparisons of different steels and of steels deoxidized differently as to susceptibility to hot tearing. The equipment is described in "Steel Casting Techniques" available from the Office of Technical Services, Washington 25. It is designated report PB 111914, and the price is $1. Tearing stresses were measured with the apparatus from 1700 to 2500°F for plain steels of various compositions. Effects of deoxidation practice and composition contents were studied. It was found that the cast steels studied could be made to tear by hindered contraction near the solidus under very low stresses.

Aluminum bumper guards produced in permanent molds adorn rear fenders of the new 1957 Eldorado Cadillac. They are cast at Cleveland foundry of the Aluminum Co. of America

Gets Quick Results

HIGH-SPEED development of x-ray images was demonstrated by the X-ray Department of General Electric Co. at the recent Western Metals Congress held in Los Angeles. In the process known as xeroradiography a metal plate sensitized electrostatically is exposed to x-rays and then dusted with a powder. The powder clings to the plate in proportion to the density of the electrical charge in various areas resulting from the exposure and converts the invisible electrical image into a visible picture. Paper copies of the xeroradiographic image for permanent record may be made. Images on the sensitized xerographic plates can be erased and the plates used again.

Approve Classifications

DURING the recent ASTM Committee Week at Philadelphia, ASTM Committee C-8 on Refractories met and approved a tentative classification for castables or refractory concrete. Approval also was given to a tentative revision of Standard Fireclay Brick Classification, C 27-41, lowering the P.C.E. (Pyrometric Cone Equivalent) requirements of the Low Duty class from cone 19 to 15. This will permit inclusion of certain steel pouring pit refractories and prepare the way for an eventual standard specification for these materials.

Studies Twist Effect

EXPERIMENTAL study to determine effects of strain rate, temperature, type of notch and size of specimen on four steels tested in torsion is described in Engineering Experiment Station Bulletin No. 438 available from the University of Illinois, Urbana, Ill. for 35 cents. Torque, angle of twist and time were recorded continuously and torsional properties were determined. In general it was found that for ranges of strain rate and temperature used, an increase in strain rate caused no appreciable change in strength but did decrease ductility and total energy absorbed. Increase in temperature caused a decrease in strength and energy, accompanied by a decrease in ductility at low strain rates and an increase of ductility at high strain rates.

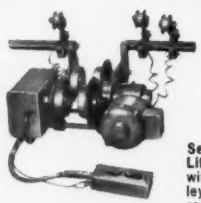
IF YOU WANT ALL THIS IN A HOIST

- ☐ 30 FPM lifting speed at the push of a button.
- ☐ Two automatic brakes — separate load and motor brakes — each so powerful it can hold the full load safely alone.
- ☐ Accurate load control — no back drop — for easy, precise "spotting".
- ☐ Safe 24-volt magnetic push-button control, plus great structural strength in every part to protect operator, load and hoist.
- ☐ Heavy-duty electrical equipment, including motor and controller especially developed for hoist service.
- ☐ Low operating and power costs because of the simply designed mechanism and maximum use of anti-friction bearings.
- ☐ Easy service-ability *in the air*, including one-point lubrication of the compartmentized gearing and load brake that operate in oil. No costly production hold-ups.
- ☐ Convertability from lug to hook, to push trolley, to motor-driven trolley *anytime* right in your own plant.
- ☐ Top performance under the most unfavorable operating conditions.

YOU WANT A SERIES "600" LOAD LIFTER

There's a whale of a difference in wire rope electric hoists — and the through-and-through quality of the Series "600" 'Load Lifter' is proving it every day on all kinds of production jobs. It solves tough hoisting problems — operates "like a charm" on a continuous duty cycle. In rigorous tests, a Series "600" 'Load Lifter' was loaded to capacity. The load was raised three feet 151 times an hour until 80,000 lifts had been made. This punishment is equal to more than two years of average industrial use. No appreciable wear was evident on any of the parts. Even the cable was in good usable condition.

Such quality is your assurance that the Series "600" 'Load Lifter' is today's most economical buy in a wire rope electric hoist of ½ or 1-ton capacity. *Get complete feature and specification data from your "Shaw-Box" Distributor or write us for Bulletin 408.*



Series "600" 'Load Lifter' Electric Hoists with motor-driven trolley. Trolley available separately for hoists already in service. Installation takes only two hours with common tools.

'Load Lifter' Jib Cranes. Self-supporting. Full revolving. Swing easily on ball bearings. No binding. A hoist on this crane can serve a 550 sq. ft. area. Capacities to 5 tons.

Cord Reels to keep the hoist conductor cord taut and up out of the way of work and worker. Also useful for small cranes and other devices with motors up to 1HP.

57F-3

MAXWELL MANNING & MOORE INC. TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

386 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, CONSOLIDATED' Safety and Relief Valves 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

When Accuracy Counts...

Depend on Three Way Alloy Control

- *Quantometric*
- *Spectrographic*
- *Wet Chemical*

A complete, accurate and quick analyses service at surprisingly low cost covering:
Aluminum—Brass—Bronze—Cast Iron—Ductile Iron.
Our facilities are geared to handle routine daily control and occasional miscellaneous samples. Mailing envelopes furnished gratis for convenient sample transmittal.

Let us be another department of your company.

Teletype PG-544, Phone FRemont 1-2345 or Write today for complete information.

SPECTROCHEMICAL LABORATORIES, INC.
P. O. Box 8781, Pittsburgh 21, Pa.

Circle 688 on Inquiry Card—Page 51

Selecting Conveyor Belts For Foundry Applications

There's a Best Type To Do a Given Job

By B. R. Fobes*

MANY foundries can save thousands of dollars every year through careful selection of conveyor belting. Belt design today is a science in itself. Hidden behind tradenames and designations are belts with specific properties that can save you money in belt and maintenance cost per ton of material handled and in reduction of lost production time. An example of this is a hot material handling belt made of special, compounded synthetic rubber which is intended for materials up to 400°F.

At one plant handling hot fines at an average temperature of 325°F, with peaks to 375°F in a "round-the-clock" operation, the best previous belt life had been one year, with fasteners reapplied every two months. A Goodrich belt of the type described now has been on this unit for 2½ years and still is operating with no signs of impending failure. Not one fastener joint has been replaced because of the belt. Needless to say, this plant has replaced all its hot-service belting with the improved type.

This same kind of saving can be obtained in other types of conveyor service by intelligent purchasing of the right belt.

Foundry Work Severe — Foundries in general average the shortest belt life of plants in any industry. In a noncompetitive business, belting manufacturers could sell large quantities of the same old belting again and again for short-life service. But the opposite is true. In keen competition, all major manufacturers of rubber belting have developed their individual answers to the varied problems of foundries in order to furnish a better belt at a lower cost per ton of material handled.

To obtain the best belt for any conveyor service, intelligent recommendations must be obtained from the belting suppliers. The suppliers, in turn, must be given all information pertaining to the unit. In some cases, the supplier's field engineers should examine the unit in operation. Necessary information may include some or all of the following: All physical data on the unit; material composition, size and temperature; ambient conditions; loading conditions; how

*Belting engineer, B. F. Goodrich Industrial Products Co., Akron, O.

Not a speck of slag or metal sticks to linings of *IRONTON* **BERLITE**

FILLED 974 TIMES,
a 1200-pound ladle handled 670 tons of metal before the lining of *IRONTON* BERLITE was replaced. The iron was poured at 2850° F. in a foundry making automotive housings.

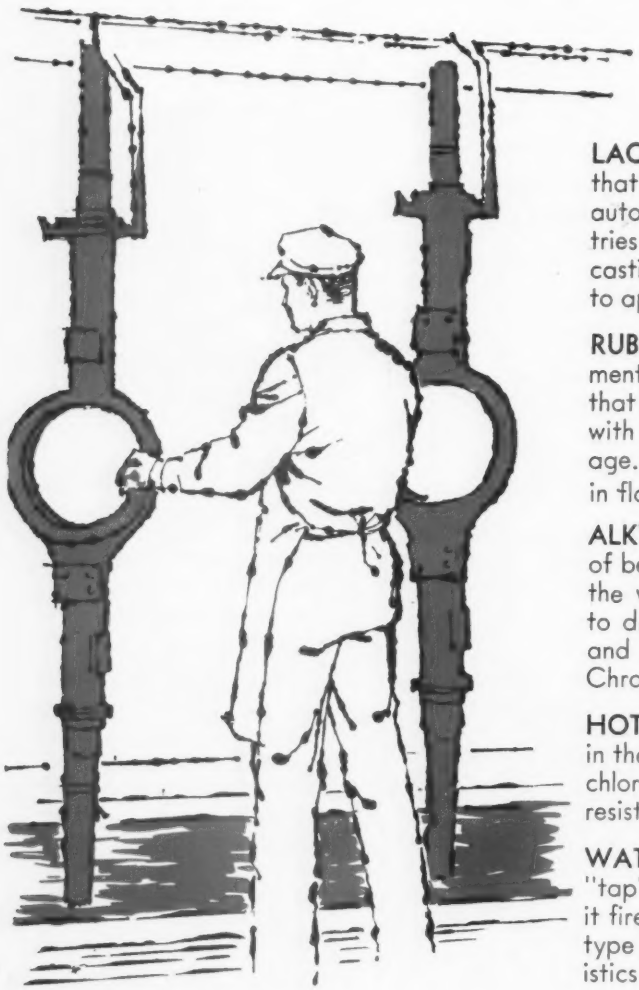
Clean Ladles
are a profit factor . . . protecting quality of castings, reducing scrap, saving labor. It pays to use *IRONTON* BERLITE in hand, bull and mixing ladles . . . because BERLITE does not shrink or expand, resists slag and metal erosion, has a higher P.C.E. than any fire clay material. Ask an Ironton foundry engineer how you can put multi-purpose BERLITE to work throughout your foundry. Call or write today.

SINCE 1917 THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO
1353 Ashtabula Street
OUR 40th YEAR OF Reliable Refractories
Write for name of nearest representative, or telephone Ironton 109

Circle 689 on Inquiry Card—Page 51

if it's sealer information you desire, look to

TOUSEY*



LACQUER TYPE: The conventional type sealer that has been used for so many years, both in automotive, farm equipment and allied industries for the successful sealing of sand mold castings. The weathering on this type is limited to approximately 90 days.

RUBBER BASE TYPE: A more recent development and an improved type crankcase sealer that accomplishes what the lacquer type does, with improved weathering and improved mileage. It, also, has the advantage of being higher in flash point (65 degrees Fahrenheit).

ALKYD TYPE: This product has the advantage of being the alkyd type which further improves the weathering requirements. It can be made to dry as does the rubber base type product and is similar to a good rust-inhibiting Zinc Chromate Primer.

HOT DIPPING TYPE: Designed for hot dipping in the Harding Process Equipment and uses Trichlorethylene as a solvent, which makes it a fire resisting type product.

WATER SOLUBLE TYPE: Designed to use plain "tap" water as a solvent portion, which makes it fireproof for plant handling. It is an emulsion type sealer that has the weathering characteristics of the "Alkyd Type" product.

Write and give us details on your specific sealing problem —we will have our laboratory send the proper recommendations to you.

TOUSEY PRODUCTS

DURACOTE for DURABILITY

TOUSEY VARNISH COMPANY

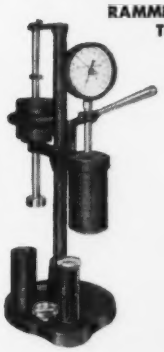
520 West 25th Street, Chicago 16, Illinois
VIctory 2-2200

THE Short Cut TO LOW Scrap Losses

When consideration is given to the number of casting defects directly traceable to faulty sand practice, it becomes apparent that proper sand control is the short cut to low scrap losses.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for the program.



RAMMER-COMPRESSION TESTER—This simple unit combines ramming of specimens for permeability tests and making bond strength tests. Strength values are read on large dial.

PERMTESTER Permeability values for molding and core sand mixtures are shown on dial in a few minutes.

All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRY MAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

GORDON SERVICE

CLAUD S. GORDON CO.

Manufacturers & Distributors

Thermocouple Supplies • Industrial Furnaces & Ovens
Pyrometers & Controls • Metallurgical Testing Machines

607 West 30th Street, Chicago 16, Illinois
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previous belts failed in service.

Foundry belt failures fall into four general classifications: 1. Heat hardening of the belt carcass and covers. 2. Longitudinal ripping of the carcass and tearing of the covers. 3. Burning of holes in cover and through carcass. 4. Oil swelling and softening of belt covers.

Heat Hardening—Heat failure is a universal problem for foundries since handling of hot sand hardly can be avoided. This type of failure is characterized by cracking of the cover from hardening (usually leading to complete loss of cover), increased stiffness in the belt from hardening of the carcass and frequent replacement of belt fasteners due to breaks in the belt behind the metal plates.

The first symptoms of failure usually are the breaks at the fasteners since the metal conducts the heat more readily into the entire belt thickness and first hardening of the belt carcass occurs here. Because rubber is a poor heat conductor, longer life has been obtained with thicker covers and cover compounds that delay the hardening effect. New compounds now are available that will increase belt life over 200 per cent.

Longitudinal Tears — Longitudinal ripping and tearing is a problem on shakeout belts at some foundries. Sharp, jagged sprues, risers, gates, etc., broken from the casting at shakeout, can cut and tear the belt. If jammed against the belt, they may slit it for the full length. Available in special construction are crosswise reinforcements to prevent extensive lengthwise damage. These reinforcements sometimes are strong enough to stall the belt or to break it transversely, if necessary, to prevent destruction of the entire belt length.

Other transverse reinforcements are designed to force the jammed metal up and out of the path of the moving belt. Nylon transverse reinforcement often is used both in the fabric plies and as cord breakers in the covers. For severe cases, crosswise groups of high-strength, flexible steel wires are incorporated into the belt construction at spaced intervals throughout the belt length.

Hot heads at around 1800°F that can burn a hole completely through the belt are a special problem in some foundries. Usually the main bulk of sand is removed at one station, and when the hot heads are knocked loose, a minimum of sand is present to protect the belt. The condition is even worse if a number of these belts feed to a transfer belt where the hot heads may contact the belt surface and be covered with a blanket of hot sand.

Since no rubber belt cover can withstand the temperature of the red to white-hot metal, the design problem

In the tap hole area of a malleable iron furnace with metal tapped at 2840° F, *IRONTON* BERLITE mortar is ***more refractory than super-duty brick.*** When the furnace was shut down for repairs after running 16 hour heats, pouring 400 tons a day for weeks, we took the photograph above. The joints of *IRONTON* BERLITE stand out like a backbone along the brick sidewall.

TOUGHEST MORTAR YET

IRONTON BERLITE will outlast any fire clay material. For an actual photograph and service report on BERLITE in a really hot installation, write to our Special Products Division.

You can have on-the-spot consultation without obligation. Call or write Ironton to arrange for a visit by our experienced foundry engineers.

THE IRONTON FIRE BRICK COMPANY
SINCE 1917
IRONTON, OHIO

1355 Ashtabula Street

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Watchdog on mounting costs

PRICES of common materials keep going up. Many new alloys are costly. Hence, rough castings become more expensive.

Even more, the cost of machining time keeps mounting. No one can afford to have it wasted by waiting for the tool to locate a void or defect.

So now is a good time to re-examine the importance of radiography. To suppliers it gives the assurance that only a quality product is delivered. To processors it gives the confidence that man and machine time will be productive—not wasted.

Today, million-volt x-ray equipment radiographs heavier parts with shorter exposures. The use of radioactive isotopes makes possible a radiographic department at moderate cost. And the new Kodak Industrial X-ray Film Type AA—with up to twice the speed of the previous film—widens the scope of all radiographic equipment.

If you would like to know how radiography can save you money—how it can keep the quality of castings high—have a serious talk with your Kodak x-ray dealer or Kodak technical representative.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Kodak
TRADE MARK

PYRO LANCE

get below surface readings for greater accuracy

Temperature readings of molten nonferrous metals are only accurate when taken below the surface, unaffected by dross and other surface conditions. That is why there is industry-wide acceptance of the Alnor Pyro Lance.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip. Enclosed couple is protected against flame, fumes and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

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has been to delay and minimize damage to the belt carcass. For this purpose, a shield of some sort is inserted in the top cover, above the carcass. A ply of asbestos in itself is very weak and gives poor adhesion to rubber compounds. Reinforcement of the asbestos with fine wire in its weave has increased its effectiveness. Better still are two bias-laid plies of a special-combination glass fabric, each floated separately from the other. Used with a flame-resistant compound, this construction will resist numerous hot contacts on the same spot in the belt cover.

Oil Can Cause Trouble—Oil swelling on foundry belt covers usually is limited to units handling core sand. "Flight" belts on molding lines sometimes are affected, however—primarily if subject to pattern spray. If there is doubt about the effect of a material on belt compounds, all rubber companies will test material samples and make their recommendations accordingly. Several grades of oil-resistant belts are available from nearly all belt suppliers. If the condition is severe, however, nearly any belt eventually will swell in its top cover and "reverse trough." For such installations, belts with equal covers top and bottom will permit turning the belt over and using the bottom cover up.

In these days of intense competition, you will find that your belting suppliers' salesmen are better equipped than ever to handle unusual problems. If they don't know the answer personally, they have behind them a pool of technically trained personnel who specialize in conveyor problems. Don't continue to put up with high costs in belt replacement, maintenance, and downtime. There probably is a less expensive belt for every tough job.

Metal Technology Course To Be Offered Next Fall

Wentworth Institute, Boston, will inaugurate a new course in metals technology next September. It is designed to train engineering technicians in metal processing industries. In the second year, students may specialize in foundry operations, metal fabrication or heat treatment of metals. An Associate in Engineering degree will be awarded. Graduates will qualify for positions as laboratory technicians, engineering assistants, production supervisors, methods analysts and salesmen.

Introduction of the course results from a survey of New England metals industry firms which disclosed a need for more trained engineering technicians in that field.

Simplify foundry use of refractories **and SAVE** with multi-purpose IRONTON **BERLITE**

ONE REFRACTORY does 7 jobs to SIMPLIFY your foundry routine. Add the necessary water to **Ironton BERLITE** and put it to work 7 ways:

RAMMED LINING for bull, mixing ladles.
MUD LINING for hand and bull ladles.
RAMMING MIX for tap & slag holes, spouts.
MORTAR for brick-lined ladles.
MORTAR for cupola block.
PATCHING MATERIAL for all ladles.
WASH COATING for ladles & cupola spouts.

SAVE ON LONGER SERVICE

Slag and metal do not stick to **Ironton BERLITE** . . . so linings are not destroyed in cleaning ladles. **MORE REFRACTORY** than any fire clay brick, **Ironton BERLITE** does not melt or slag out. Since **BERLITE** meets every refractory need, your inventory and delivery worries are over. You'll eliminate refractory repairs, too. **BERLITE** is stored dry; you should never have any waste. Day-to-day service tests prove these facts.

We will send you enough **Ironton BERLITE** to test in your shop under your conditions. We ask only that you pay the freight. If you need help, Ironton engineers are always available to work with your men and show them exactly how to use **BERLITE**. Write or phone us **today.**

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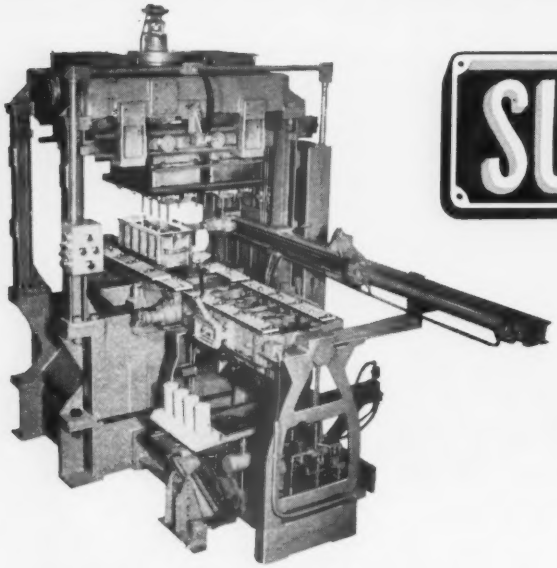
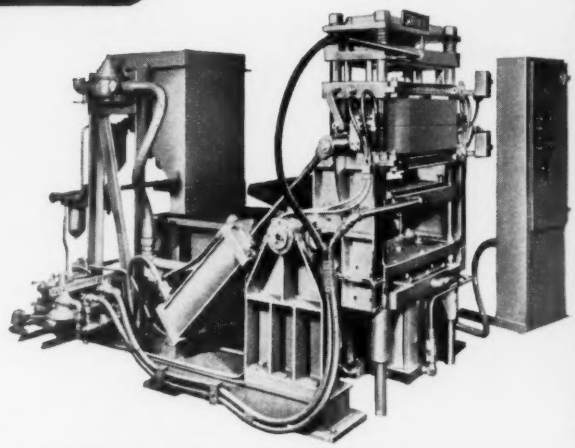
SUTTER



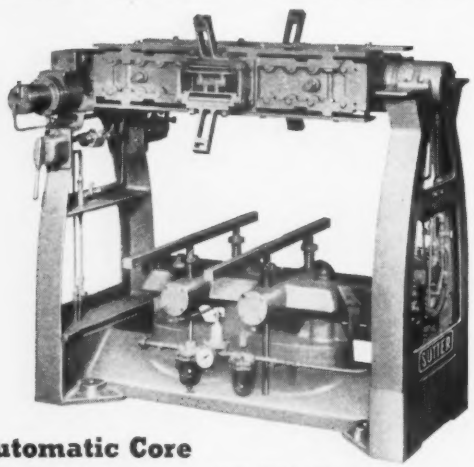
SUTTER SP-221 "Mechanicore" Dual Head Automatic Core Blower

Automatically blows up to 250 cycles per hour. Two refill stations . . . one head blows as the other refills. Use 2 heads for double production on same core, or blow 2 different cores with 2 different sands. Core box transfer device, automatic double rollover and core draw, core push-out device and core elevating device available (illustrated). Maximum core box sizes—Double Head: 32″ x 16″ x 10″; Single Head: 32″ x 30″ x 10″. Maximum core weight 125 pounds.



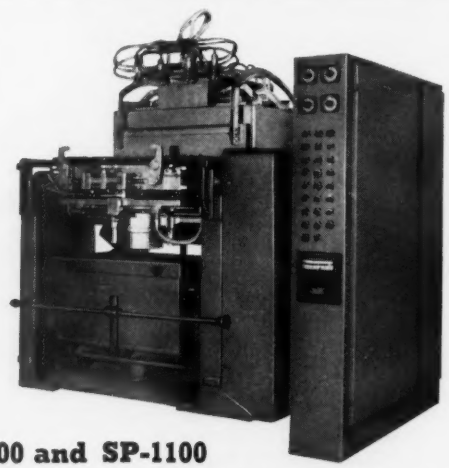
SUTTER SP-1300 and SP-1400 Automatic Shell Core Blowing Machines

Blows and cures high quality precision cores, solid or hollow, at up to 90 cycles per hour. Controlled gas pattern heating. Positive stripping. Rock down, bottom blow. Unskilled operators produce precision cores with this equipment. Core box sizes—SP-1300: 24″ x 14″ x 10″; SP-1400: 38″ x 18″ x 10′.



Automatic Core Draw Machines, SP-500 Series

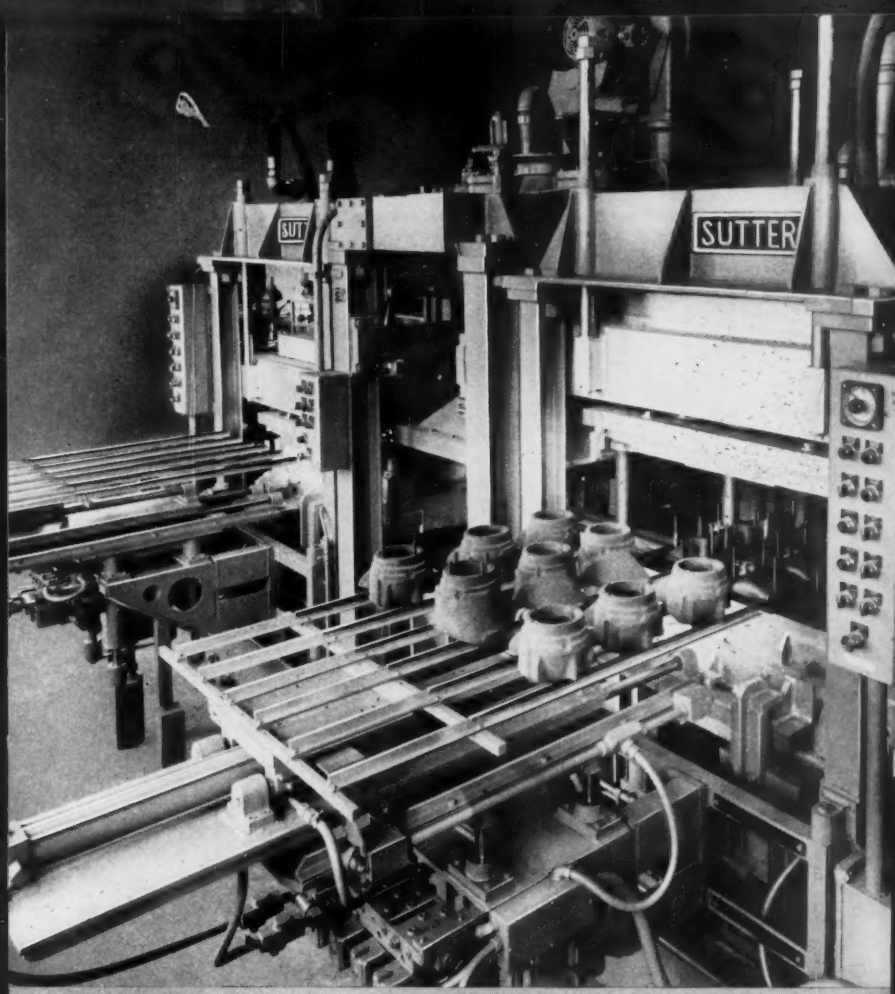
Completely automatic cycle boosts core production and provides uniform quality. Operator places core dryer, dryer is clamped, box rolled over and core drawn automatically. When used with blower, operator easily handles both. Three standard and heavy duty models; heavy duty also available with side draw-backs. A variety of sizes and models to suit your application.



SP-1000 and SP-1100 Automatic Shell Molding Machines

Features include rollover assembly, large resin sand bin, spray frame assembly, electrically and air operated control panel and choice of gas or electrically heated pattern and oven. All electric and pneumatic circuits conform to J.I.C. standards. Maximum pattern sizes—SP-1000: 30″ x 20″ x 6″; SP-1100: 41″ x 26″ x 12″. Bonding machines available.

Please write for technical bulletins on above equipment

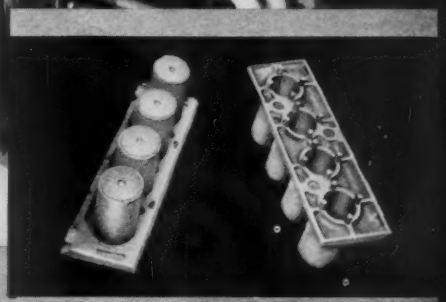


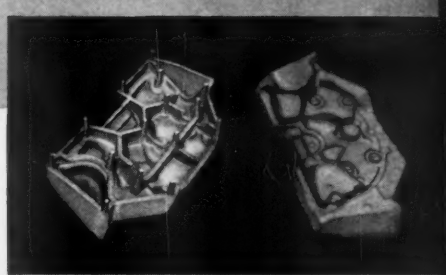
NEW! FULLY AUTOMATIC TWO-STATION

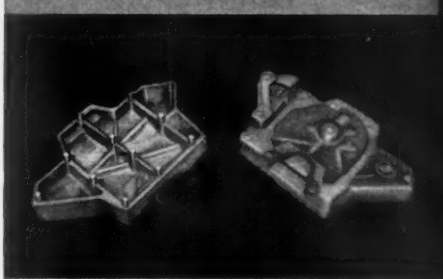
SHELL CORE and MOLD BLOWERS

Now . . . a two-station fully automatic machine that's designed to produce shells or sets of shells at up to 90 cycles per hour! The new Sutter SP-1500 and 1550 machines produce smooth, precision shell cores or molds, fully cured, ready for immediate use at the molding line. These machines save man-hours, fuel, rehandling, breakage, cleaning and overall costs . . . and produce better castings.

Multiple stations allow faster cycling of shell patterns between the blow and the cure and strip stations. Shell take-out and pattern spray equipment are standard on both units. All electrical, gas and pneumatic equipment conforms to both J.I.C. and national safety standards. Maximum pattern sizes: SP-1500: 36″ x 27″ x 10″; SP-1550: 26″ x 20″ x 10″. Write or call now for complete information on this revolutionary step toward new foundry practices.







SUTTER PRODUCTS CO.

407 HADLEY STREET • HOLLY, MICHIGAN

Designers and manufacturers of foundry machines and equipment.

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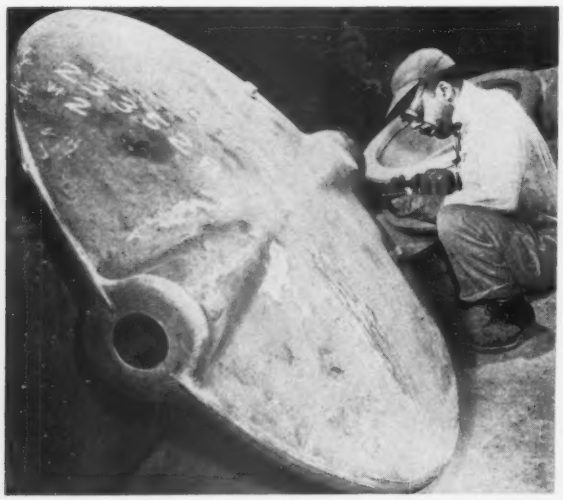
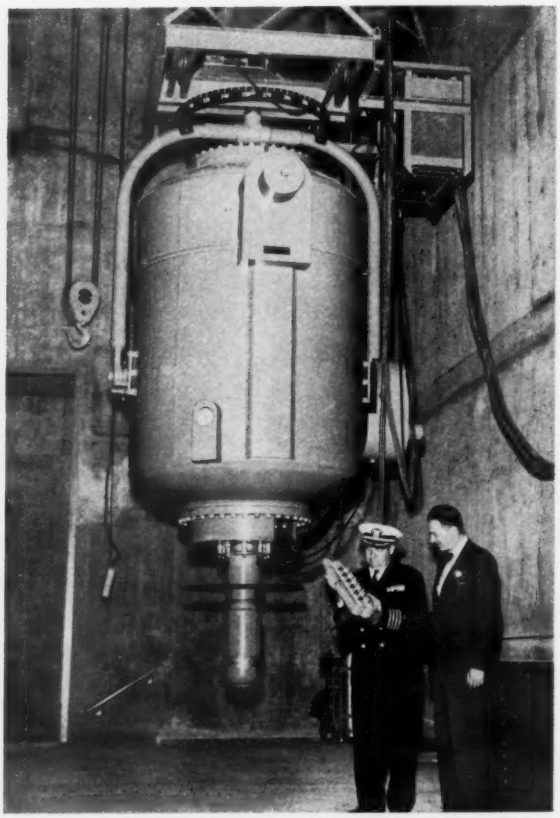
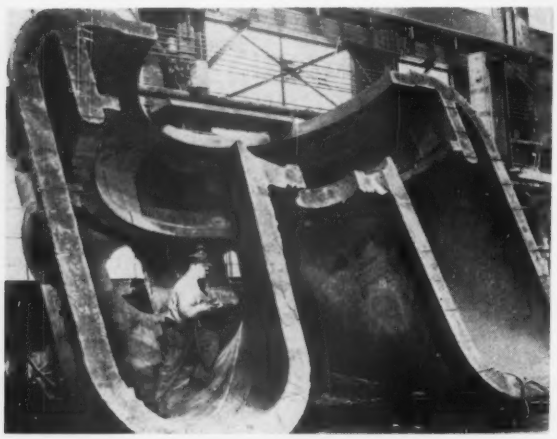
News Views



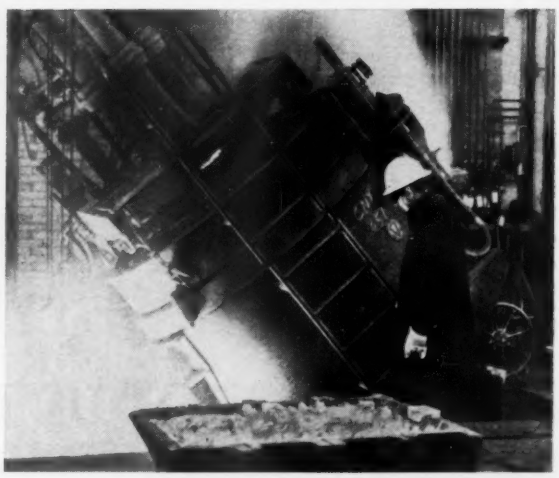
WAFER VALVE DISC: Unusual wafer valve disc weighing 1701 lb was cast recently by the Buffalo Foundry of Allegheny Ludlum Steel Corp., for the W. S. Rockwell Co., Fairfield, Conn. The disc was cast in a single piece with the center of each side being cored. Metal sections are ¾ in. thick and are made of type 304 stainless steel. The valve is 48 in. in diameter and will be used in a circulating water system through which corrosive salt passes



2-MILLION VOLT X-RAY: Quality of Naval weapons ranging from atomic submarines to guided missiles will be guarded by this 2-million volt x-ray machine at the U. S. Naval Magazine, Port Chicago, Concord, Calif. Shown with the new unit at its recent dedication are Captain Elias B. Mott, commanding officer of the magazine, operating the control board and Ernest W. Milburn, industrial representative, X-Ray Dept., General Electric Co., the builder



HUGE CASTING: Largest casting produced by General Electric Co.'s Foundry Department, Schenectady, N. Y., is this 101,040-lb upper exhaust hood for a 171,000-kw steam turbine. While it took only 3½ minutes to pour the casting, a period of 20 weeks was needed to prepare the pit and mold, clean, cool and ship the casting. Wesley Weaver, chipper, is dwarfed as he grinds away during clean-up of the 10-ft-deep x 14-ft-high x 22-ft-wide casting



STEEL MELTING FURNACES: Steel melting furnaces are among the varied equipment of the new pilot plant built by Vanadium Corp. of America adjoining the VCA research center and operating plant at Cambridge, O. The pilot plant combines modern laboratory research with practical operating conditions to meet ever-changing demands of industry, to further practical research in ores and raw materials and to facilitate process and product development

An Announcement of Great Importance to the Buyers of Foundry Equipment

affco

American Foundry Flask Company

The American Foundry Flask Company, a division of Cromb and Gagel, Inc., Kansas, City, Missouri, announces the purchase of the sales and manufacturing rights to the "Perfection" or "BS&B" flask line made for over thirty years by Black, Sivalls and Bryson of Kansas City, Missouri.

This purchase included equipment, inventory, engineering data and all factors pertaining to the flask division of B.S. and B.

The same high quality, expert craftsmanship and engineering excellence previously found in this fine line of flasks will be continued, according to A. H. Cromb, president of the newly formed company. "Black, Sivalls and Bryson have set a wonderful and challenging record for us to meet and beat," said Mr. Cromb, "We are determined to both meet it and beat it."

C. E. "Joe" Boettcher, formerly sales manager of the flask division of Black, Sivalls and Bryson, has been appointed to the same position with American Foundry Flask Company. Mr. Boettcher's engineering and sales experience in the flask field are well known. American Foundry Flask will maintain the same lines of distribution as Black, Sivalls and Bryson previously used.

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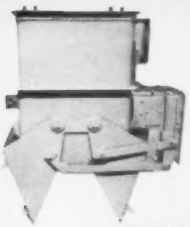
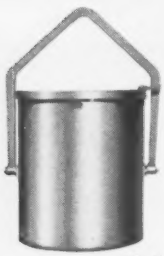


30-AMO

1-A



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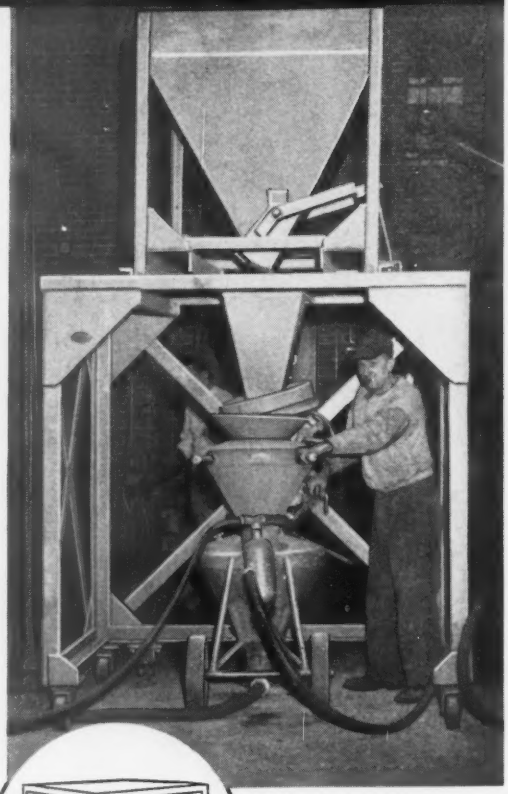
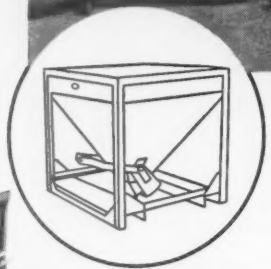
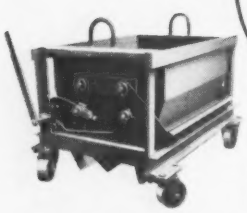
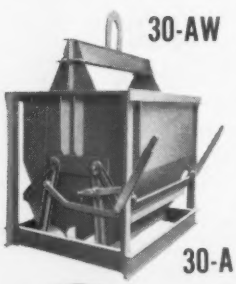




A special P-I designed hopper bucket makes cupola lining more efficient.



30-AW



30-A

WHERE bulk materials handling operations are costing you money and slowing production, Penn Iron Engineers can solve your problem economically, efficiently.

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Circle 699 on Inquiry Card—Page 51

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Hot Sand"

THE troubles of a sandman are many, and I suspect that the big boss knows little about most of them. Of course, he pays some attention to reports of sand committees and to technical articles which deal with molding materials, but I doubt that he devotes a sympathetic interest to the subject for more than five minutes a month.

Every other facet of his business he explores in minute detail. He can make your head swim discussing costs, accident frequency, capital gains and whatnot, and he has precise figures on foundry loss—scrap and returns. He knows when casting finish suffers (his customers tell him about this).

He is fully aware that on certain jobs, production sometimes takes a nosedive, and his profit with it. He blames the molder, foreman, pattern or something else—anything but the real offender: Hot Sand.

He knows how many extra hours are required to grind objectionable swells and roughness from a surface that must pass muster. His loss figures may identify percentages of swells, blows, dirt, wash, etc., but they say nothing whatever about hot sand, the probable offender. Usually when the sandman, foreman or molder complain of this condition, he is led to believe that nothing can be done about it.

The molder is advised to start the day by covering his patterns with this hot sand until the patterns are equally hot. Some shops heat their patterns with gas or electricity, a measure which is but a palliative at best. By this expedient, you can make molds, and you can produce castings, such as they are. But I have yet to see completely satisfactory or reliable production stem from hot sand.

In 1946, I visited a shop where I

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The "two-step" Jet CO_2 process JET CO_2 BOND STABILIZER . . . AND THE JET CO_2 BOND SERIES OF BINDERS *produces better molds and cores.*

The addition of Jet CO_2 Bond Stabilizer is a big step forward to new efficiency in your CO_2 operation. The Stabilizer improves the flowability and workability of the mulled sand to a degree never before obtainable in the CO_2 process. This is accomplished with the following, simple two-step procedure.

Step 1

JET CO_2 BOND STABILIZER

Step one is the mulling of the sand with ½ to 1% of Jet CO_2 Bond Stabilizer. The sand and stabilizer are mulled before the sodium silicate binder is added to the mix. This forms a base mixture that produces a fluffy, silken sand. The use of Jet CO_2 Bond Stabilizer not only improves flowability and workability but also produces a mulled sand with much longer bench life. It not only produces superior cores and molds but also eliminates ramaway on intricate work. Binder consumption cut as much as 25%. Jet CO_2 Bond Stabilizer will make any sodium silicate binder work better.

Step 2

JET CO_2 BOND

The second step in the process is the addition of the binder to the already mulled sand and stabilizer.

Jet CO_2 Bond is a series of compounded silicate binders developed by the Swan-Finch Laboratories in cooperation with several of the leading foundries in the country. The outcome, a series of products for the CO_2 process assuring maximum strength and hardness, easy ramming, faster gassing and improved collapsibility. Additional qualities of the Jet CO_2 bond series include lower viscosity permitting easier mixing, longer bench life of the mixed sand, less gas evolution and increased storage life of the finished cores.

Working samples and complete literature on Jet CO_2 Bond Stabilizer and the Jet CO_2 Series of Binders will be sent to you on request for test purposes in your foundry. A qualified Swan Finch engineer will gladly help you select one of our series of binders for your particular requirements.

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Circle 764 on Inquiry Card—Page 51

saw 125 engine blocks and heads being poured per hour. The molding sand was reconditioned and reused every 45 minutes and was so hot as it covered the pattern that the molder couldn't hold it in his hands. The foundry had hot patterns, and its loss probably did not exceed 20 per cent. But even the castings sold were a disgrace to the industry, and I certainly wouldn't have wanted one of them in my automobile.

If the sandman looks on moisture control as his most important consideration, surely hot sand takes second place as the bane of his existence.

It's Hard To Check—Foundrymen periodically spend large sums of money to improve their various departments and achieve a competitive position. Most of this investment produces tangible and visible returns. The boss's figures reflect the results with reasonable accuracy. But I can assure you that casualties incurred from hot sand successfully defy this method of computation. There probably are exceptions to this rule—foundrymen who will not for a moment tolerate hot or unaged sand. I hope some day to meet such men, but they are exceptions, not the rule, and I'm talking about the fellows in my own class.

Sometimes I feel that we look on this hot sand problem in much the same manner as we might on a drunken relative: We're ashamed of him. Our attempts at reform have failed; he is apparently incorrigible; yet we have to live with him. So we try to take the situation in stride simply by ignoring him—a good trick if you can do it.

Or you might liken this steaming material in your sand system to a small internal cancer in the human system. It takes its toll daily, and although you may manage to allay suffering by diet or special medication, you know you are playing a losing game. There the analogy ends. Most cancer is considered incurable, whereas hot sand responds admirably to the right treatment.

If hot shakeout sand could be broken down to grain size, then aerated through a curtain of moist air, it undoubtedly would be reasonably cool as it entered the muller. With the addition of clay and water and with careful mulling, whatever heat is generated should be negligible.

Now let's assume that we store enough of this sand for at least three days of operation, thus never using either hot or unaged sand. At this point, I expect, many of my readers will throw up their hands, completely discouraged, and shout, "We have no room to store such a quantity of sand! We now are using our entire supply every day, and sometimes two or three times a day!"

I can appreciate your situation, for I, too, have only a day's supply on hand. I have thought many times of purchasing or fabricating a cooling system that might meet requirements, even though I don't know of one that will cool sand to 60° F, as I would like.

Sand and Whiskey Differ—I've been told that it now is possible to age whiskey artificially, but to age sand, time still is required. I know that the following statement will be disputed by many men in both laboratory and foundry, but I'm sure that at least 10,000 molders will support me. To wit: If you test newly mulled hot sand by instruments in current use, your test readings will closely approximate those of the same sand after it has been cooled and aged for three days. But the working properties of the two sands will be almost diametrically

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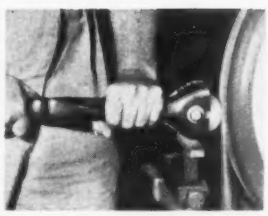

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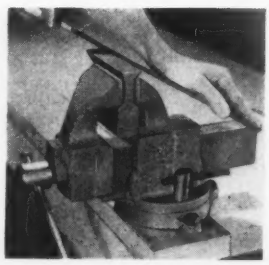

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Circle 702 on Inquiry Card—Page 51

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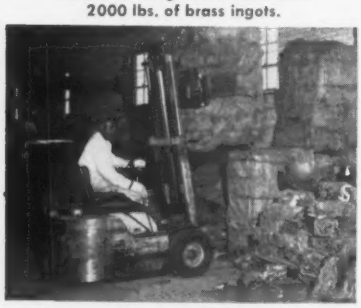
Feeding a 600 lb. bale of copper shavings to a furnace.

Double decking drums filled with 2000 lbs. of brass ingots.



Stacking bales of yellow brass scrap saves space.

Using vertical storage space for a metal skip containing 1500 lbs. of scrap copper.

Dumping a 4000 lb. slag pot.

CHICAGO, ILLINOIS — Elesco Smelting Company has effected sizable cost reductions in their materials handling procedures by use of Hyster Lift Trucks and Load-Grab attachments. Where by former methods three men worked 8 hours (24 man-hours) to unload a car of scrap, now the lift truck and driver do the same job in 2 hours (2 man-hours)...a saving of 22 man-hours (or 91%).

Loading a trailer with ingots formerly required 3 men working 2 hours (6 man-hours); now the same men, using a Hyster Lift Truck get the same work done in 30 minutes (1½ man-hours)...a saving of 4½ man-hours (or 75%).

Both the 2000-lb. and 4000-lb. pneumatic tire Hyster Lift Trucks are kept busy throughout the day on all types of handling jobs. At night, when the furnaces are charged, both lift trucks are kept busy hauling scrap to the furnaces.

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Company officers state that considerable overall savings are achieved by Hyster methods as a result of better utilization of labor, time and space. Your Hyster Dealer makes it his business to keep up with materials handling progress in smelters and foundries. Call him today. He will help you to analyze and increase efficiency of your handling procedures.

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opposed in molding operations.

Hot sand leaves in its wake a trail of trouble. It sticks to the pattern in varying degrees. Being brittle, it causes stickdowns and drops. It invariably reduces man-hour production, and casting finish is affected adversely. It is responsible for more dirty castings and gas holes than any record ever will reveal. Under the nondescript title "sand failure," it hides successfully.

Undoubtedly many foundries have space and facilities for proper handling of return sand—such equipment as lump-breakers, suitable screens, aeration, exhaust, and forced-air cooling. Most jobbing foundries do not enjoy this condition, however. Who can satisfy the needs for this low-budget majority?

Sand cooling prior to mulling is but one consideration, and not even entirely necessary—perhaps not necessary at all. I consider the second step more important—namely, storage of enough prepared sand to satisfy requirements for at least three days. Hot sand need not be considered a liability prior to mulling. The cooling can be accomplished after mulling, during the three-day aging period, with a gain of additional values. Every molder and machine operator knows this to be true.

How It Used to Be—Let's look back for a moment to those "good old days" of screen and shovel, windrows and naturally-bonded sand when each molder poured his own floor, shook out the molds, added new sand and sprinkled a measured amount of water over the exposed surface. He then cut and heaped this sand into a steaming windrow or rounded pile. As a final touch, he slicked the surface with glancing blows from the back of his shovel, thus retarding the escape of water-vapor.

On the following morning, 14 to 15 hours later, he shoveled that sand through a sloping screen to produce a velvety, uniform moist heap. He knew how much metal he was pouring on a given day, the general ratio of metal to sand and the approximate loss of moisture. In replacing this loss of strength and moisture, he had learned through experience just about what was needed, and his hand served as laboratory. Of course, he couldn't maintain the close limits of modern synthetic practice, but with naturally bonded sand, he didn't need to. His margin for error was much wider. His molding methods compensated to a great extent for low permeability, high moisture and soft molds.

Have we forgotten the lessons of yesterday? Over a 15-hour period,

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It is your guarantee of uniformity and exacting laboratory control

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Circle 766 on Inquiry Card—Page 51

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that tightly packed, steaming heap of sand absorbed and diffused moisture in a manner that has not been improved upon. I am not recommending a return to yesterday's methods or materials. That chapter is, I hope, closed forever. But I do insist that its lessons should not be forgotten. Aging or maturing is as important to the working properties of molding sand as to whiskey or friendship!

It Can Be Done—I am reasonably convinced that it is both possible and practicable to maintain a three-day supply of prepared molding sand. I believe that such practice would pay visible dividends to any foundryman who kept reasonably accurate records.

Of course, there would be problems. Has any foundry ever been free of them? Suitable sand storage costs money and requires extra space. Moisture balance would have to be revised to accommodate atmospheric changes and the time lapse between muller and molder. But these problems are not insurmountable. In this belief, I expect at least one of my readers to tell me of his idea of an acceptable method for storing, cooling and aging prepared molding sand, a method that might be made available to the fellow who thinks he can't afford it.

Fluid Power Group Elects Leaders at Annual Meeting

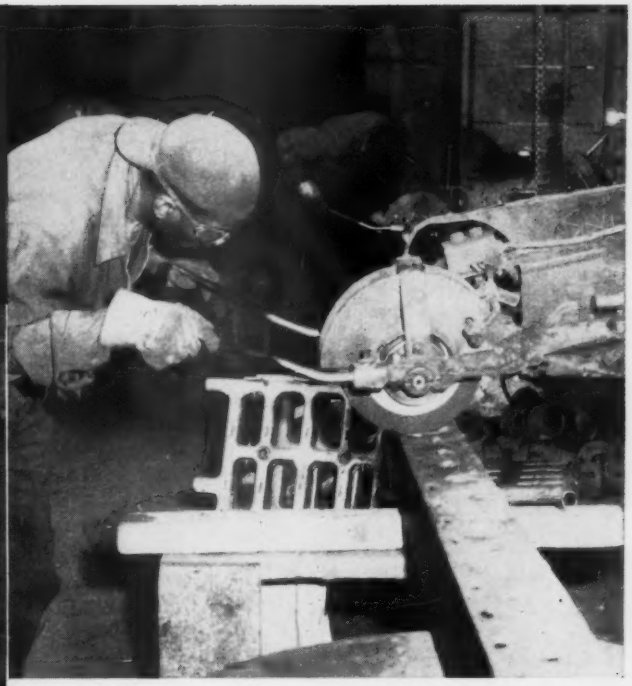
Officers and directors of the National Fluid Power Association were elected at its 1957 annual meeting in Hollywood Beach Hotel, Hollywood, Fla., Mar. 13-15. New officers for the coming year are: President—R. J. Murphy, Kalamazoo Division, New York Air Brake Co., Kalamazoo, Mich.; first vice president—J. A. Marsh, Rivett Lathe & Grinder Inc., Boston; second vice president—L. L. Charlson, Char-Lynn Co., Minneapolis; treasurer—Ellwood G. Peterson, Hannifin Corp., Des Plaines, Ill.

Directors for three years are: John E. Goldring, Modernair Corp., San Leandro, Calif.; Oliver G. Lear, Fluid Control Inc., Mentor, O., and G. R. Pittman, Hydraulic Power Division, Hydraulic Press Mfg. Co., Mount Gilead, O.

Directors for one year are: David Fromson, Greer Hydraulics Inc., Jamaica, L.I., N.Y., and Wilson H. Cole, Simplex Engineering Co., Zanesville, O.

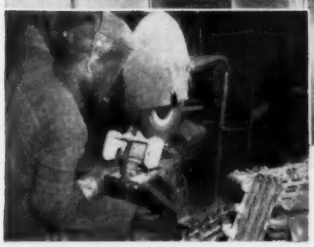
Barrett Rogers, 1618 Orrington Ave., Evanston, Ill., is general manager and secretary.

ALLOY GRINDING in a PROGRESSIVE FOUNDRY



Cleaning Room Foreman Charles Karr is proud of his department's record in safety, production, and costs.

Swing frames snag the larger castings. Alloy foundrymen will recognize the absence of sparks on these tough metals.



Cut-off wheels also have tough assignments on these alloy metals. Note air-operated chain clamp for safety.

Small swing frame grinder, with 12" x 2" wheel makes fast work of odd shaped parts locked in adjustable air vise.

Double and single head pedestal grinders with 16" 20" and 30" wheels handle the bulk of the smaller alloy castings.

Bay State Grinding Wheels Help Keep Cleaning Costs Low at General Alloys Company

Casting alloy metals for America's food-processing, chemical, oil, and heat treating industries is the business of General Alloys Co., South Boston, Mass.

The metals they pour are tough ones: stainless, as well as the special alloys developed to resist heat, acids, and other chemicals. Because each is also a tough metal to grind, cleaning costs are an important cost factor. This makes the life and cutting qualities of grinding wheels especially critical in selecting the right wheel for each job.

Because its cleaning room demands dependable abrasive products and engineering service covering all phases of foundry grinding, General Alloys Company has used Bay State as a principal supplier for many years.

A call to any Bay State distributor or branch office will bring the same capable abrasive product service to your foundry . . . or write direct to the Westboro plant.

BAY STATE ABRASIVE PRODUCTS CO.
Westboro, Massachusetts, U.S.A.

Branch Offices and Warehouses:
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Distributors — All principal cities
In Canada:
Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

BAY STATE
WHEELS of PROGRESS

The door to higher quality, longer wear and greater economy in abrasives . . .

ABRASIVE SHOT & GRIT CO., INC.

Springville, New York
Telephone: Springville 1

Circle 707 on Inquiry Card—Page 51

Obituary

LEWIS F. MOORE, 65, president, Walker Machine & Foundry Corp., Roanoke, Va., died Mar. 28. A graduate of Virginia Military Institute, Mr. Moore was named treasurer of the company shortly after it was founded in 1920 and had been its president since 1921.

Andrew H. McDougall, former vice president, Whiting Corp., Harvey, Ill., died Mar. 8. A graduate of University of Michigan, Mr. McDougall joined the company in 1903. He served as designer, chief draftsman, chief engineer, and was a vice president from 1919 until his retirement about 10 years ago.

Charles O. Kirchhan, 86, co-owner, Milwaukee Brass Specialty Co., Milwaukee, died Mar. 12. He had been engaged in manufacture of brass, bronze, aluminum and gray iron castings since 1922.

Max Fiedler, 64, founder and former president, Milwaukee Gas Cock Mfg. Co., Milwaukee, died there Mar. 6. Mr. Fiedler founded the valve company in 1928 and sold it in 1952 when illness forced his retirement.

Howard R. Youngkrantz, 43, chief engineer and metallurgist, Apex Smelting Co., Chicago, died Mar. 27. A graduate of Illinois Institute of Technology, he had been with Apex 21 years.

Martin L. Ritter, 62, for over 40 years manager of sales, Farrell-Cheek Steel Co., Sandusky, O., died Feb. 8.

Berger O. H. Anderson, 61, pattern engineer in the Magnesium Division, Howard Foundry Co., Chicago, died Feb. 26.

Robert W. Gothard, 65, assistant superintendent in the foundry of Erie City Iron Works, Erie, Pa., died Mar. 4.

British Castings Production Falls Off Slightly in 1956

According to the Iron and Steel Board, London, S.W. 1, England, the 1956 production of iron castings in England was 3,899,170 tons, compared with 3,925,070 tons for 1955. Production for the first two quarters of 1956 was substantially ahead of 1955 but fell off sharply in the last two quarters.

You're **SAFER**
—time and money ahead
with— **TM**
factory made
ALLOY SLINGS!

TAYLOR uses
GAMMA RAY
QUALITY CONTROL
on master, joiner and end links...

CONTROLLED-ATMOSPHERE HEAT-TREATING
on popular chain sizes

New, patented
TAYCO HOOKS!
Pat. No. 2,646,306—7/21/53

Famous TM factory made Alloy Sling Chains are tougher—and safer! The use of Gamma Ray assures flawless, trouble-free welds on master, joiner and end links. This, in addition to our rigid standards...Controlled-Atmosphere Heat-Treating of popular sizes... patented Tayco Hooks and other superior production techniques, makes TM factory made Alloy Slings a better buy!

Call your INDUSTRIAL DISTRIBUTOR today!

S. G. TAYLOR CHAIN CO., Inc.
Hammond, Ind.
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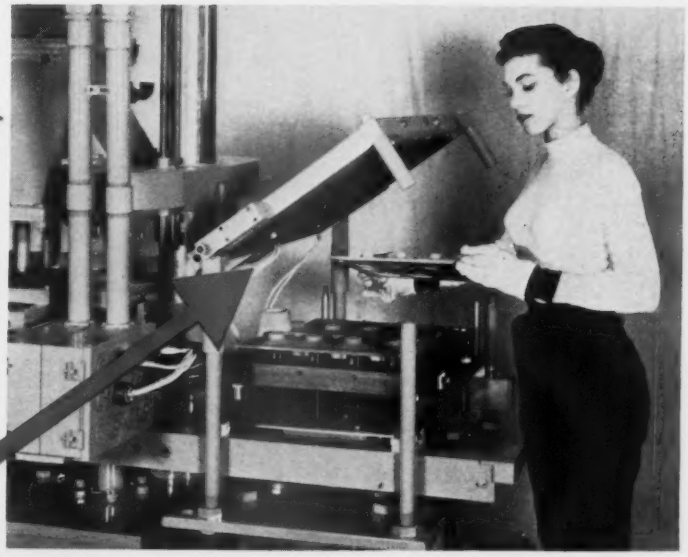
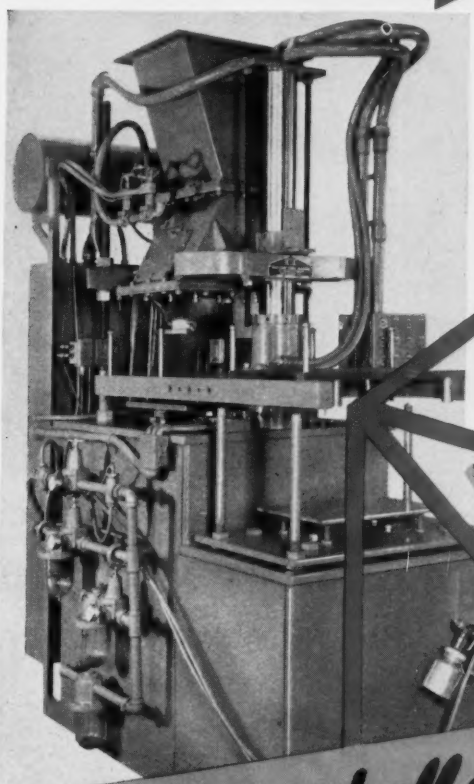
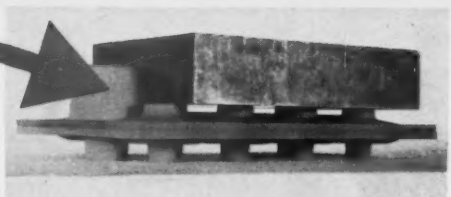
TAYLOR MADE
A GREAT NAME IN
Chain SINCE 1873

Circle 778 on Inquiry Card—Page 51

Look!

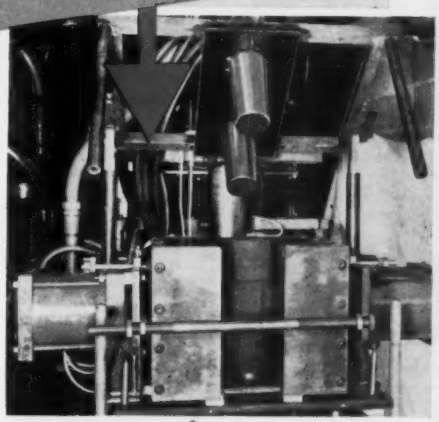


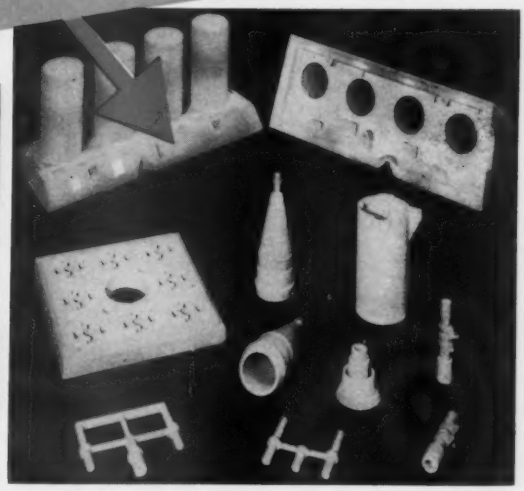




No other shell machine is so flexible

Pictured at right is a 4-part core box. Combination vertical and horizontal parting fixtures open and close the box in 4 directions and eject the finished shell core, complete, ready for immediate use. WRITE FOR FULL PARTICULARS.





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PRODUCTS COMPANY

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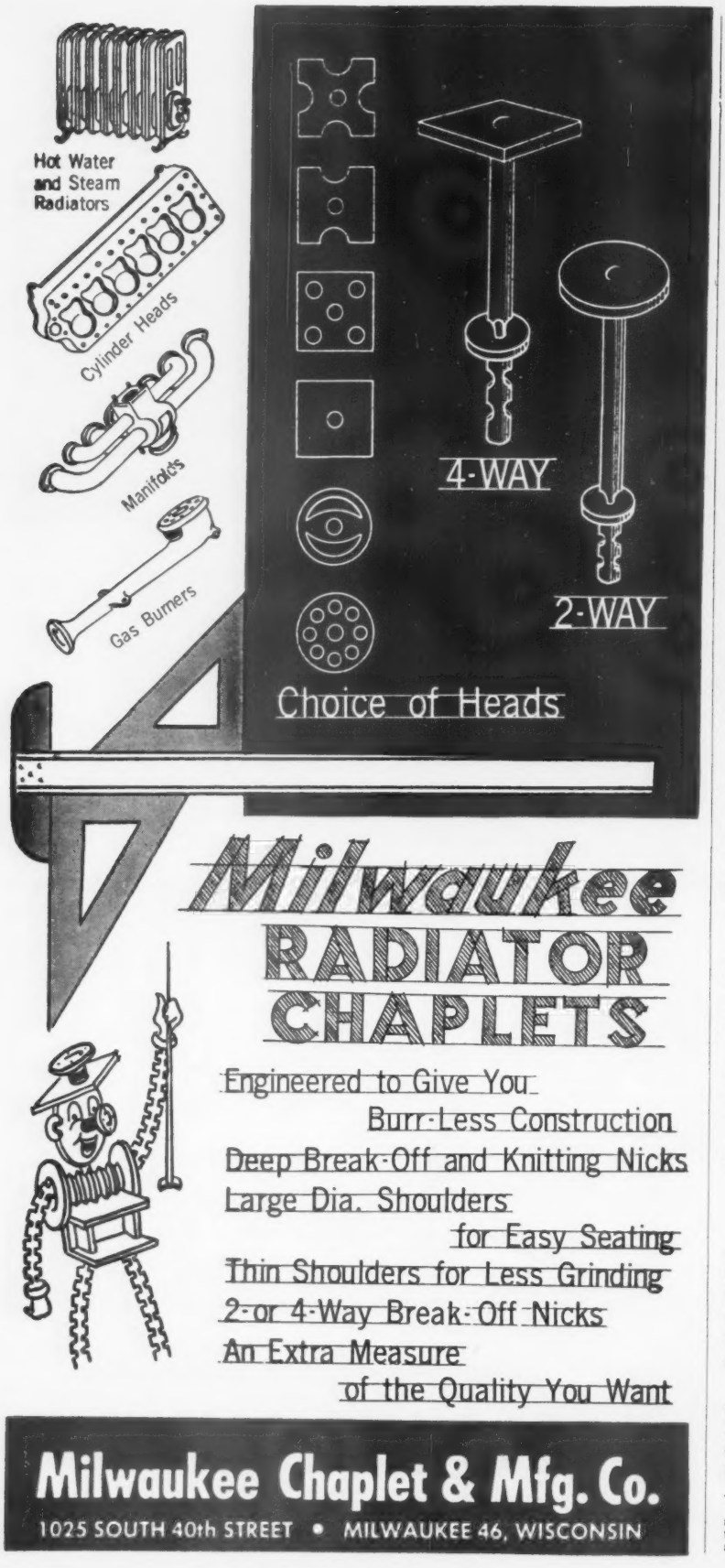


How To Choose the Legal Structure for Your Firm

Here's a Discussion of The Three Chief Types

By Edward L. Anthony*
and
A. Barr Comstock*

IF a small concern is to operate effectively and continue to exist beyond the present ownership, its legal structure must be right. For this reason, many small business operators ask these questions: Should a proprietorship be continued? Would partnership be better? What about incorporation?

Joe Porter's Problem — Consider, for instance, Joe Porter. In 1945, he started a small plastics molding business. Today, he owns a modern factory with good equipment, has 97 employees and annual sales of $940,000.

Until lately, Joe enjoyed being sole owner. He liked being able to make independent decisions. Nevertheless, Joe did listen carefully when his account brought up the effects of sticking to the *status quo*. For one thing, tax considerations backed up the point.

Last year, Joe's firm turned in a net profit of $47,000. His personal and family expense totaled $14,000. All the same, he had had to pay personal income tax on the entire business profit. After subtracting $4000 for exemptions and deductions, he reported $43,000 and paid a $19,000 tax. However, if the firm had been a corporation and he had taken, say, $17,000 salary, his tax bill would have looked like this:

Personal income tax on $17,000 salary (less $4000 exemptions and deductions) ..... $3420.

Corporate taxes on the net profit (after salary) of $30,000: 30% on $25,000 ..... $7500.
52% on $5000 ..... $2600
Total tax $13,520

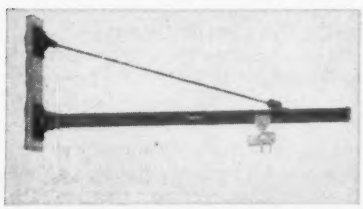
Thus, if the company had been incorporated, Joe would have saved $5480 in taxes. Moreover, there would have been no objections from the Internal Revenue Service to a $17,000 salary for the president of a business the size of Joe's.

Three Main Choices—Broadly speaking, there are three principal kinds of business. Proprietorship, the easiest to begin and end, can have the most flexible purpose, needs no

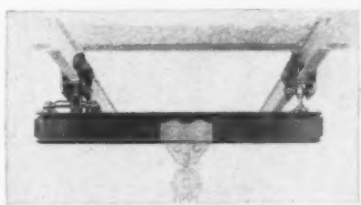
*Mr. Anthony is with the Managerial Assistance Division, Small Business Administration. The late Mr. Comstock was special assistant to the Attorney General.

Reduce handling costs with . . . R-W CRANE and "TRU-TRED" MONORAIL SYSTEMS

Modern foundries have found that they can now efficiently and safely cut costs, and speed-up production by installing R-W Cranes and Monorail Conveyor systems. Whether you need a single unit for a specific operation or a complete system, R-W Cranes and Monorail Conveyors combine ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. R-W Cranes and Monorail systems are available in a size to efficiently and economically meet your specific requirements.



R-W 939 Swinging Jib Crane . . . available in a wide variety of sizes and capacities up to 4000 lbs. . . . Furnished with rod support. R-W 968 Jib Crane has curved track to support the outer end of boom.



R-W 971 Flexible Traveling Crane . . . self adjusting yoke and cross head . . . will not bind as bridge need not maintain right angles to tracks. Available in variety of sizes and capacities up to 8000 lbs. Not applicable as a transfer crane.

Why not let an R-W Sales-Engineer show you, without cost or obligation, how R-W equipment can effect remarkable savings for you in time, money and maintenance. Write today for complete information.

Richards-Wilcox
MANUFACTURING COMPANY
"MATERIAL HANDLING DIVISION"

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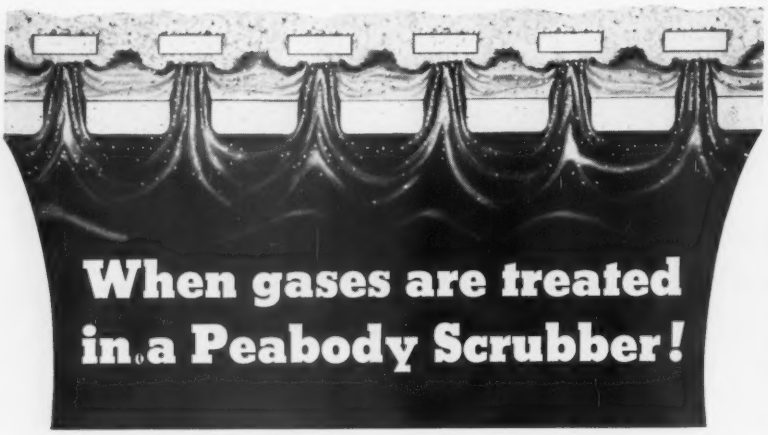
A Clear Sky from a Polluted Stack



When gases are treated in a Peabody Scrubber!

- **Objective**

  CLEAN • COOL • ABSORB

  simultaneously by means of the

  PEABODY

  Multi-orifice Impingement Baffle Plate

- **Design**

  Thousands of gas orifices

  An impingement baffle over each orifice

  A controlled blanket of liquid

- **Operation**

  Suspended matter trapped

  Heat transferred

  Solubles absorbed

- **Result**

  Clean, dry, cool gas!

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government approval, has business profits taxed as personal income and makes the owner personally liable for debts and taxes.

Partnership, the simplest for two or more people to start and terminate, has the same flexibility, has partners taxed separately and makes all except limited partners personally liable for debts and taxes.

Corporation, the most formal of structures, operates under state laws, has continuous and separate legal life, has its scope of activity and name restricted by a charter, has the business' profits taxed separately from earnings of executives and owners and makes only the company (not the owners or managers) liable for its debts and taxes.

Six Points To Check—In analyzing your own situation, it pays to get advice and guidance from legal counsel. It is worth while for the top executive to be familiar with the highlights of six main points on legal structure in addition to tax considerations: 1. Costs and procedures in starting. 2. Size of risk—that is, amount of investors' liability for debts and taxes. 3. Continuity of the concern. 4. Adaptability of administration. 5. Influences of applicable laws. 6. Attraction of additional capital.

Costs and Procedures in Starting—Single proprietorships are the easiest to start. Costs of formation are low. Basically all you have to do is find out whether you need a license to carry on your particular business and whether you have to pay a state tax or license fee.

General partnerships also are started simply. You can set one up by having the executives in the business sign what is called a partnership agreement. A written document is not necessarily a prerequisite, however, since an oral or implied agreement can be equally effective.

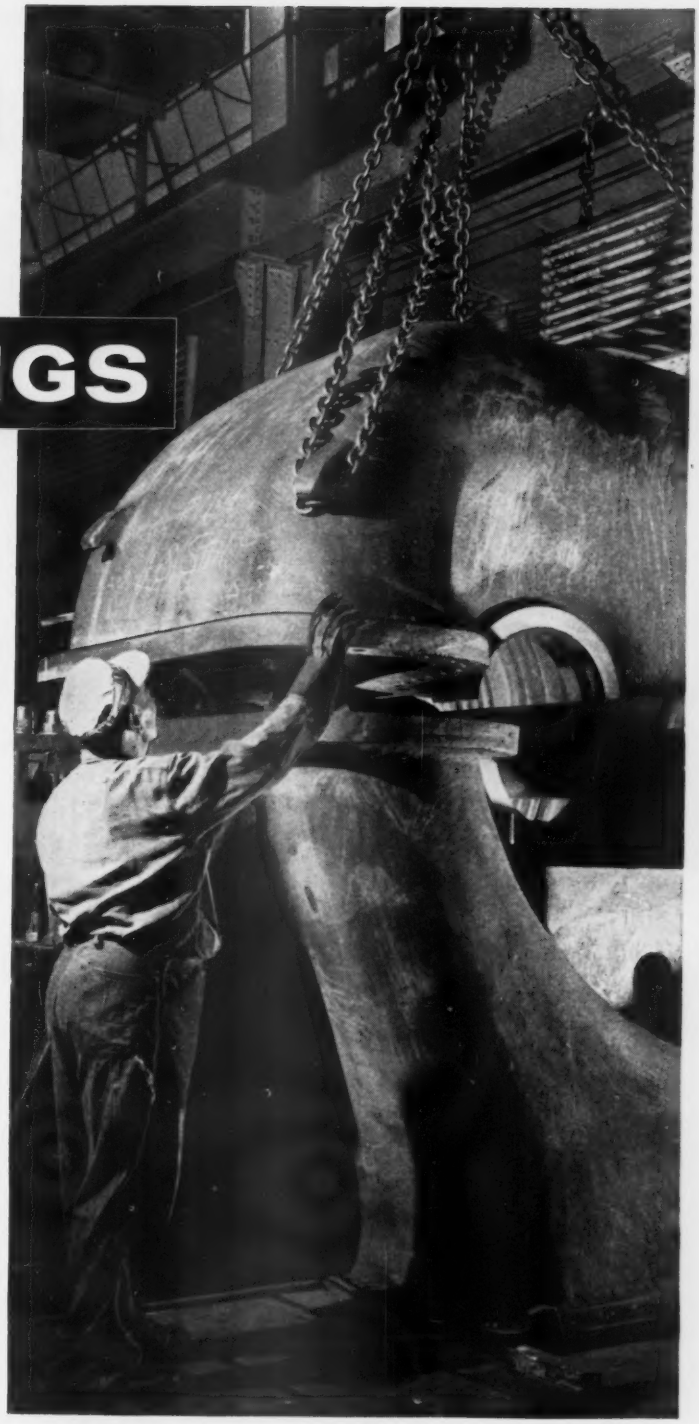
Limited partnerships are somewhat more difficult to set up. To form one, you file, with the proper state official, a written contract drawn to legal requirements. This contract permits you to limit the liability of one or more of the partners to the amount they invested, but you also must designate at least one general partner. All limited partners must have invested in the partnership. According to the Uniform Limited Partnership Act, those investments may be either cash or tangible property, but not services. Lastly, you must conform strictly to the laws of the particular state in which you organize. Otherwise, your business will be considered as a general partnership.

Corporations are more complicated

Ingersoll-Rand does

BIG THINGS

with Hanna pig iron



Castings made in the Ingersoll-Rand foundries vary in weight from a few ounces to 30 tons. But one thing that never varies is the quality of I-R castings. For over 30 years, Hanna Furnace has been furnishing Ingersoll-Rand with ever-increasing amounts of pig iron that has the high metallurgical qualities and exact analyses required for its engineering grades of iron.

Hanna's wide product range includes the Hanna 38-lb. pig, the foundryman's favorite standard, in all grades, silvery and HannaTite, our special controlled, close-grain iron. Also the HannaTen ingot, a 10-pounder with finer grain structure and no free carbon pockets. The HannaTen also is available in all grades, silvery and HannaTite.

Our customers know that Hanna and its representatives are eager to be of service to them.

Turbine castings, totalling 55 tons, being checked in a test assembly after final machining at the Ingersoll-Rand plant at Phillipsburg, N.J.

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THE BEST KNOWN NAME IN IRON

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JANUARY 15, 1957

BETTER PRODUCTS SECTION

PHOTO COURTESY AMPCO METAL, INC., MILWAUKEE, WIS.

LITHIUM DE-OXIDIZES HUGE COPPER CASTING 99.8% Conductivity Obtained

MINNEAPOLIS—Special

Ampco Metal, Inc., Milwaukee, Wis., obtained high structural soundness and electrical conductivity for the centrifugally cast copper ring (photo above) used in casting aluminum. As-cast weight of the ring was 1800 lbs. Approximate as-cast size is 50" O.D., 6" thick.

LESS THAN 1/5 of a pound of metallic lithium added to the melt resulted in a dense, oxygen-free casting minus only .2% of being 100% conductive.

AS LITTLE AS 0.005% (2¼ gram cartridge) refines high temperature copper, brass, bronze, and nickel-silver, producing a sounder, more uniform casting.

THE SALTS of Lithium, Carbonate and Chloride benefit the heat treater by lowering bath melting points.

Is your foundry using Lithium? Our banks of electrolytic cells can supply experimental grams or commercial tons. Send for details of actual foundry tests.

(ADVERTISEMENT)

Lithium Firm Doubles Sales for 9 Months

Lithium Corporation of America, Minneapolis, reported Thursday that in the first nine months of 1956 its net sales were more than double those in the same 1955 period.

Herbert W. Rogers, president, in a report to stockholders, said sales were $8,699,028 in the nine-month period, compared with $4,276,... the same period a ye...

...1956 perio... ...ared wi...

Green Giant to Spend 2½ Millions on Can Plant and Warehouses

...t Co., Le Sueur, ...ed to a 47-per-cent increase ... Tuesday it ... net sales a... ...pared ... ...ss of ...

... trends ahead in industrial applications for lithium

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2600 RAND TOWER, MINNEAPOLIS 2, MINN.

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PLANTS: St. Louis Park, Minnesota • Bessemer City, N. C.
RESEARCH LABORATORY: St. Louis Park, Minnesota

to form than the other types of organization. You must follow strictly the legal procedures of the particular state in which the corporation is being set up. First, certain responsible people are needed to organize and become officials in the new corporation. They must file with the designated state official a special document called the "articles of incorporation." Then they must pay an initial tax and certain filing fees. Finally, to do the business for which the corporation was formed, various official meetings must be conducted to deal with specified details of organization and operation.

The Size of the Risk—The degree to which investors in your enterprise risk legal liability for its debts of the business is important. Regardless of legal structure, creditors always are entitled to be paid out of business assets before any equity capital may be withdrawn. When those assets are insufficient, the extent to which owners must meet creditors' claims out of their own pockets varies with the type of organization.

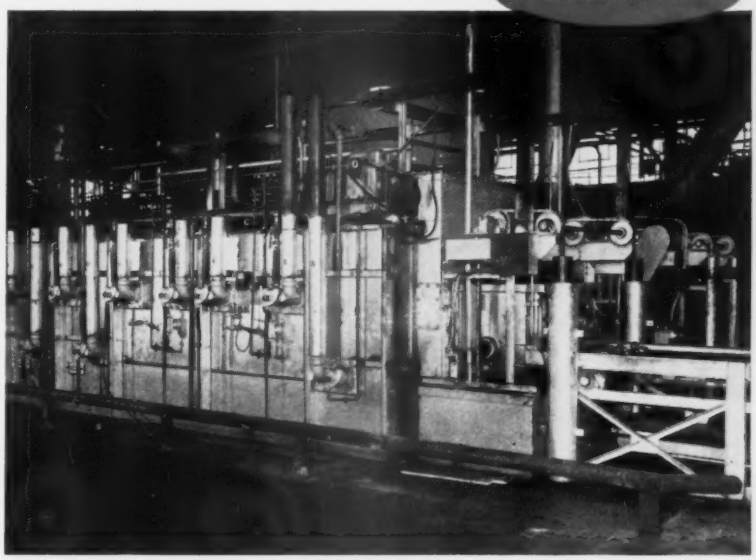
A single proprietor is personally liable for all debts of his business. He cannot restrict his liability in any way. Likewise, each member of a general partnership is fully responsible for all debts owed by his partnership—irrespective of the amount of his own investment in the business. In a limited partnership, however, the limited partners risk only the loss of the capital they have invested. General partners in a limited partnership are, however, liable jointly and severally for all debts. And remember—there must be at least one general partner in any limited partnership.

Corporations have a real advantage, as far as risk goes, over other legal structures. Creditors can force payment on their claims only to the limit of the company's assets. Thus, although a shareholder may lose the money he put into the company, he cannot be forced to contribute additional funds, although the corporate assets may be insufficient to meet creditors' claims.

Continuity of the Concern—In choosing the legal structure for your business, you also should understand how it influences the continuity of the business. Although single proprietorships have no time limit on them by law, they are not fundamentally perpetual. Illness of the owner may derange the business, and his death ends it. Partnerships are perishable in the same general sense.

Corporations have the most permanent legal structure of all. They have a separate, continuous life of

BLAZING THE HEAT TREAT TRAIL WITH HOLCROFT



LET'S TALK ABOUT

PRODUCTION DEMANDS

High production demands can be met only when every piece of equipment in the plant is geared to its job. In many plants, the bottleneck is heat treating because furnaces which were modern five years ago are virtually obsolete. These units must be replaced, redesigned, or added to.

Automatic handling of materials is one answer, of course. Today, some heat treating systems are tied right into production lines. In other plants, work is centralized with automated equipment eliminating most stock handling. A single operator loads green work and removes finished parts.

Some furnaces accomplish dual jobs. A recent Holcroft installation was built to temper two entirely different classes of carburized parts. The furnace was designed with a double chamber with each side operating at the required temperature. Flags, placed on the trays requiring low temperature tempering, keyed the line so that the work automatically positioned itself in front of the correct chamber. Another installation featured a double deck furnace—designed so that two entirely different heat treat processes were accomplished in space where but a single furnace would normally go.

And so it goes: a little idea to save a minute or to eliminate a manual operation—a brainstorm that combines two or more furnaces or steps up furnace capacity. This Holcroft concept can help you produce more for less and with better quality. Better write today.

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PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

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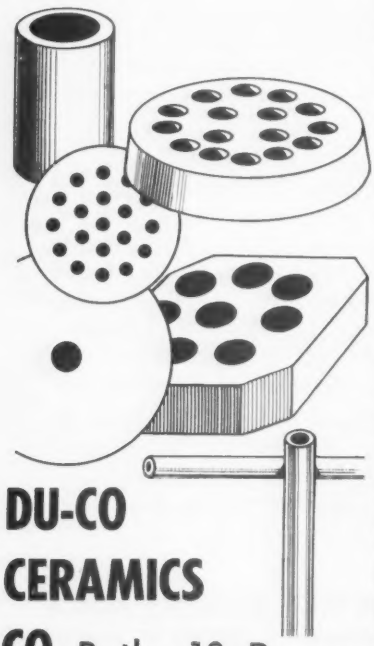
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

One way to get
CLEAN CASTINGS
is to get
CLEAN METAL
and one way to get
CLEAN METAL
is to strain it through
DU-CO
High Temperature Ceramic
STRAINERS

Fusion point, well above 3056°, makes them safe to use with any metal. Tubes or cores any diameter, any length. Send used samples or prints for quote. High quality, superior products, prompt delivery.



DU-CO CERAMICS CO. Butler 10, Penna.

Circle 716 on Inquiry Card—Page 51

their own for an unlimited time.

Adaptability of Administration—In the single proprietorship, policy and operations rest, of course, in one individual. Concentration of management avoids the problems of opposing factions and divided responsibilities. The fact that the chief executive is in full charge and is in complete control of profits can be an incentive to careful management. On the other hand, many a man is not competent to handle all management jobs himself. To be sure, an owner can employ assistants to whom he assigns various details. It is worth noting that after incorporating, the owner of a small business does not necessarily lose control of the enterprise.

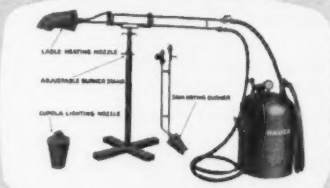
In general partnerships, the combined abilities and knowledge of several executives give the partnership an advantage over the single proprietorship. But the division of functional responsibility among several partners may lead to fundamental policy disagreements. When you compare them with corporations, partnerships have the following administrative features: Decisions may be taken and changes adopted simply by oral agreement among the partners. In limited partnerships, the limited partners may not engage in management functions; if they do, they may be held fully liable as general partners. They are, however, entitled to inspect the books and obtain full and complete information regarding the business.

In corporations, stockholders do not necessarily participate either in operations or in policy formulation, but they may. Corporations have an advantage over partnership in this way: In partnerships each partner can act as general agent for the business; in corporations, however, the stockholders cannot bind the firm by their acts just because they have invested capital in it.

Influences of Applicable Laws—Little doubt remains as to the influences of law regulating the legal rights and obligations of single proprietorship. Likewise, the relationships are clear between a sole owner, his agents, his creditors and others with whom he deals in business. A private citizen working in Iowa can carry on business in Kansas without paying any greater taxes or incurring any more obligations in Kansas than local Kansas businessmen have.

Broadly speaking, this same situation is also true for a partnership. Of course, a state may require the purchase of a license to carry on a particular kind of business. But the license will be equally available to businessmen of any state so long as

BETTER HEATING with HAUCK OIL and GAS EQUIPMENT



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Heats Ladles • Dries Molds
Lights Cupolas

Portable Oil Burners
for Heating and Drying Ladles

Portable Gas Torches
for Heating and Drying Ladles and Molds

High Pressure Air-Gas Torches

for Heating Ladles and Drying, Heating and Vitrifying Rammed Furnace Linings

Also Portable Oil Burners—Hand Pump, Compressed Air and High Pressure Type; Gas Burners for All Foundry Heating Processes. Write for Catalog 1043C.

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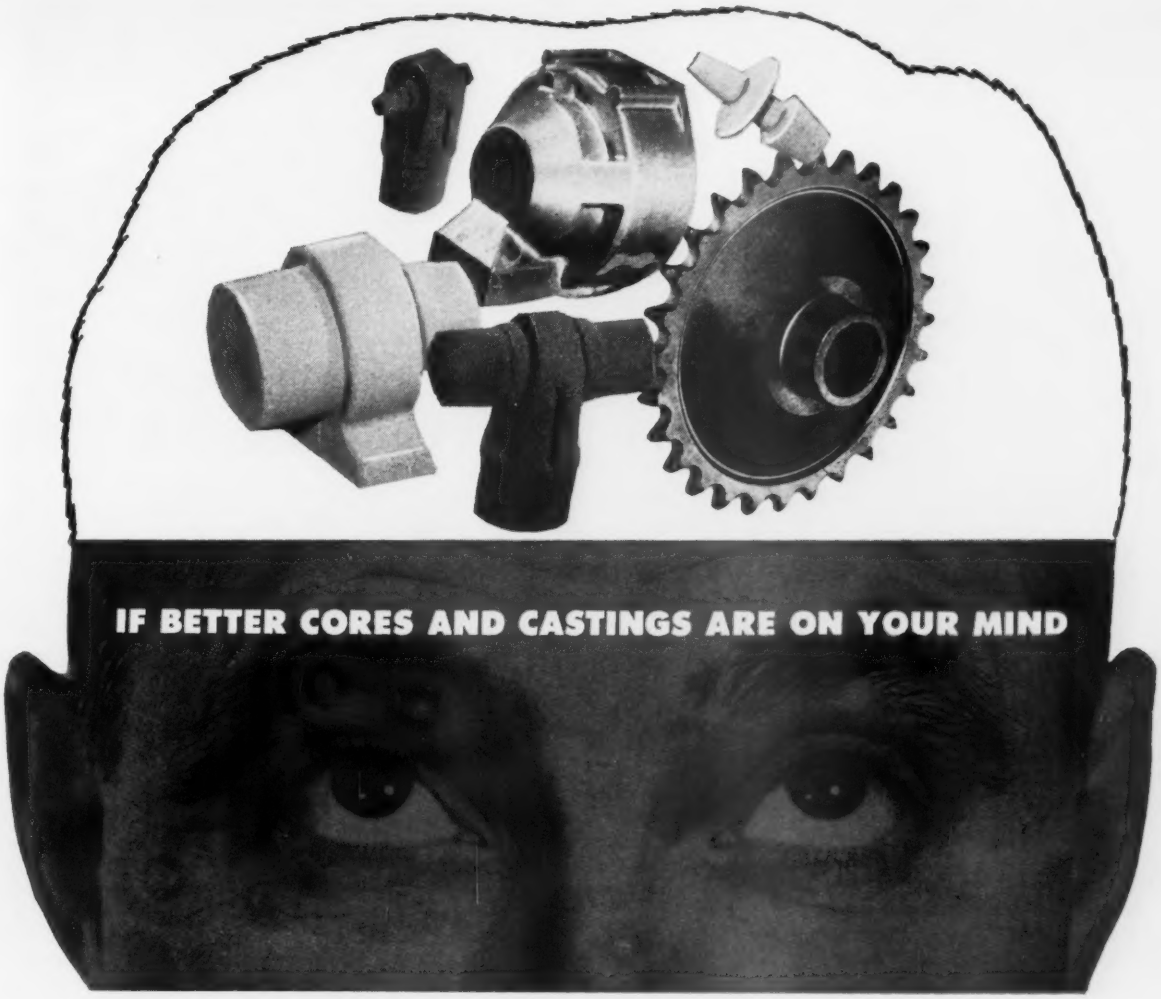


...IT'S TIME FOR *Borden* FOUNDRY RESINS

Start now to make those thoughts of better castings in greater volume a reality! Contact us for a trial run of Borden resins in your core production . . . and watch things happen.

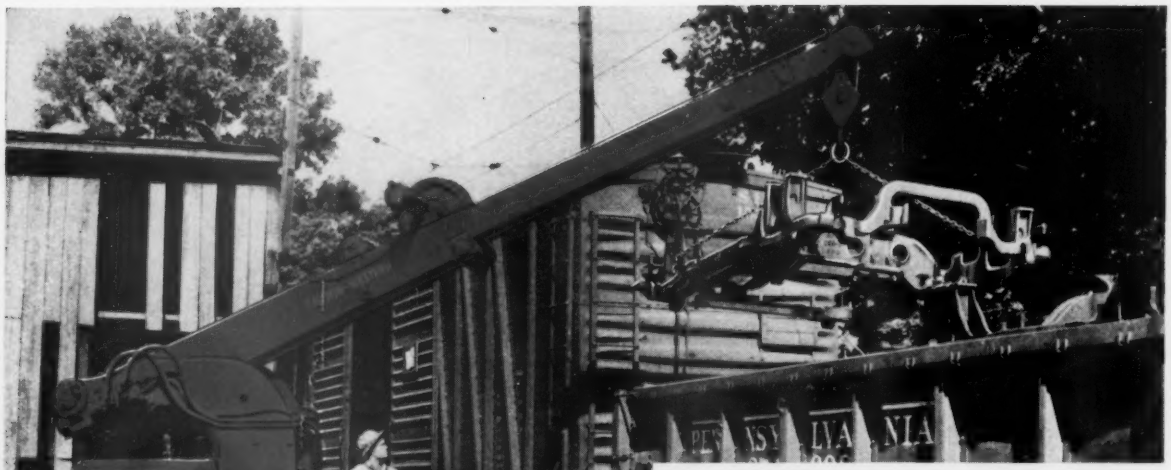
Better, cleaner, harder cores . . . *faster*. Because all Borden core binders are quality controlled to assure uniformity . . . promote faster baking, easier shake-out, contain no volatiles to gum up oven interiors. And they even eliminate smoke so working conditions are improved and manhours saved.

If you're using *shell molds*, then Borden's Thor MCF-7 will assure a full-thickness build-up even on vertical pattern surfaces. And it provides a flat rigid shell without warpage . . . a shell that strips off the pattern quickly, cleanly, neatly.

So whatever your operation . . . now's the time to translate those plans into *action* that will pay off in *profits!* For that trial run with a Borden engineer to help, contact The Borden Company, Chemical Division, Dept. F-57, 350 Madison Ave., New York 17, N. Y.

IF IT'S A *Borden* *Chemical* IT'S GOT TO BE GOOD!

UREA AND PHENOLIC RESIN CORE BINDERS • SHELL MOLD RESINS • CORE SPRAY • CORE PASTE • PARTING AGENTS



A-W's live boom makes it the ideal tool for loading and unloading freight cars.

Here's the most versatile hoisting tool in industry... the A-W HYDRAULIC CRANE

Versatile A-W saves many costly hours of maintenance time.

Combining its unique pickup, carrying and placement capabilities with the best features of other types of cranes, the A-W Hydraulic Crane sets a new standard of performance. Take a look at some of the reasons why it does more jobs better than anything in its class:

Live boom action—The 18-ft. boom is under complete hydraulic control, responds instantly to the operator's touch with smooth, positive action. Rotates a full 360° if necessary. Can extend and lift a live 5-ton load while it pulls, moving forward or backward at the same time. Because it's powered both ways, up and down, you can't drop anything you're hoisting—an important safety feature.

Works indoors and out—Its sturdy, close-coupled chassis with all-wheel steer gives fast travel in and out of buildings and around obstacles. All-wheel drive and oversize tires take it through sand, across rough terrain, over rails with perfect ease. When the going is particularly tough, when storage areas are muddy or snowy, or there are ramps to climb or freight cars to push, all-wheel drive and the torque converter (optional) really do a job.

Easy, low-cost operation—Simplicity is the key-word for the entire operation of the A-W Crane, and anyone can easily learn to operate it in a very short time.

As for costs, this is the report of a typical user: "The daily machine cost of $11.11 is less than one hour's payroll of the six men this tool assists. With it, they are able to do a job in half the time. Very conservatively, our hydraulic crane is returning 100% a year on our investment."

Ask your nearby A-W distributor to tell you all about the time- and money-saving advantages of this remarkable machine. Or write direct to Austin-Western, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Aurora, Illinois.

Write for Data Book 2253—full of facts on working ranges, boom extensions, minimum aisle widths, tractive effort, towing capacity, and special attachments.

Power Graders • Motor Sweepers • Road Rollers • Hydraulic Cranes

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AURORA, ILLINOIS, U.S.A.

they conform to prescribed uniform standards.

Corporations owe their legal life solely to the states in which they are organized. No other state is required to recognize them. To be sure, all states do permit out-of-state corporations to function inside their boundaries. Nevertheless, out-of-state corporations always must comply with special in-state obligations. Also, corporations are regulated by state laws, which vary considerably. Even when the language is similar, these laws can be interpreted differently. Therefore, in running a corporation effectively, legal counsel is virtually indispensable.

Attraction of Additional Capital—Every business may require additional funds from time to time to carry on operations. It is important, therefore, in deciding on legal structure, to take into account the means for attracting new money.

In single proprietorships, the owner may raise additional money by borrowing, purchasing on credit and investing additional amounts himself. Since he is personally liable for all the debts of his business, banks and suppliers will look carefully at his personal wealth.

Partnerships often can raise funds with greater ease since the resources of all partners are combined in a single undertaking. Like single proprietors, partners must accept full personal liability for business debts.

Corporations usually are in the best position to attract capital. They may acquire additional funds by borrowing money by pledging corporate assets. Also, they may sell securities to the public. A shareholder's investment in a corporation will not subject him to any financial risk beyond the amount of his holdings, and, as a part owner, he has the prospect of sharing in any profits which may be earned.

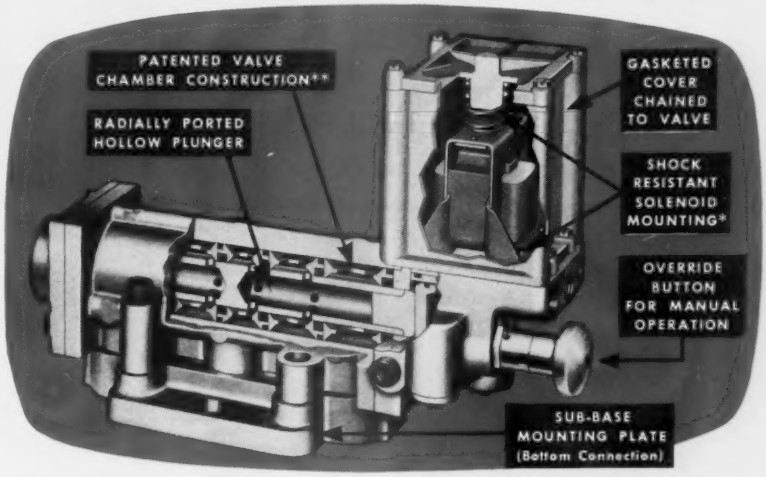
Condensed from *Management Aids for Small Manufacturers* No. 80, published by the Small Business Administration, Washington 25, D. C.

Film Shows Logic of and Need For Industrial Plant Safety

"The Margin of Safety," a 20-minute motion picture released recently by Hy-Test Safety Shoes, Division of International Shoe Co., depicts the logic and necessity of industrial plant safety and the need for wearing safety shoes. The film supplements an earlier film, "One Ounce of Safety." Both films are available for showing without charge and may be obtained by contacting the company at 1509 Washington Ave., St. Louis 3.

Quick-As-Wink®

JIC 1/2" TYPE BJ SOLENOID VALVES


PATENTED VALVE CHAMBER CONSTRUCTION**
RADIALLY PORTED HOLLOW PLUNGER
GASKETED COVER CHAINED TO VALVE
SHOCK RESISTANT SOLENOID MOUNTING*
OVERRIDE BUTTON FOR MANUAL OPERATION
SUB-BASE MOUNTING PLATE (Bottom Connection)

offer users many outstanding advantages

Painstakingly designed, ruggedly built and tested for more than 4 years, these new JIC Quick-As-Wink valves combine:—

1) **HIGH FLOW CAPACITY.** The valves have full ½" pipe capacity.

2) **SHOCK RESISTANT SOLENOID MOUNTING*.** Positioning the solenoid with a spring on resilient rubber rings reduces destructive hammering and pounding, greatly increasing solenoid life.

3) **DIE CAST ALUMINUM COVERS** are fully gasketed, mounted with captive screws, and fastened to the valve with a chain.

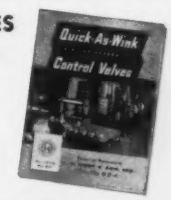
4) **SUB-BASE MOUNTING PLATE.** Available in two designs so that pipe connections can be made through the bottom or through the side.

5) **PATENTED VALVE CHAMBERS** are formed by aluminum spacers in accurate metal to metal end abutment** that hold the "O" rings and "U" packers in exact position, and supported on both inside and outside diameters, without mechanical pressure. This proven construction permits repacking easily, quickly and accurately in the field.

6) **OVERRIDE BUTTON** permits manual operation in case of power failure.

MANY OTHER OUTSTANDING FEATURES

Also available in 2 position and 3 position Double Solenoid;—2 position and 3 position Lever Operated;—and Single and Double Pilot Operated Designs.



Get full details about this new valve.
Write for Bulletin No. 571—Today!

*Patent Applied For **U. S. Patent 2,645,450

Quick-As-Wink®
AIR AND HYDRAULIC
Control Valves

Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated

Mfd. by C. B. HUNT & SON, INC., 1975 East Pershing St., Salem, Ohio

Leaders in Iron & Steel Scrap Since 1889
For over half a century our experience, personnel, equipment and key office locations have contributed to the steady growth of the iron and steel industry. Possibly our facilities may help you solve a problem in iron or steel scrap—no matter how big or small.
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Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1955					
Total	827,162	165,482	298,349	355,203	.....
1956					
Jan.	74,152	15,861	24,528	33,253	121,924
Feb.	73,096	15,560	23,963	32,949	115,958
Mar.	73,785	16,597	22,816	33,965	110,642
Apr.	67,880	14,732	20,718	31,782	106,477
May	65,786	15,570	19,699	29,814	102,121
June	58,189	13,448	19,067	25,027	102,068
July	52,955	12,398	16,388	23,491	106,620
Aug.	61,407	13,100	18,067	29,553	109,352
Sept.	62,503	12,354	17,855	31,640	111,785
Oct.	74,209	14,389	21,120	37,782	110,818
Nov.	69,741	14,333	20,673	33,929	113,356
Dec.	67,333	13,391	20,557	32,931	118,185
Total	801,036	171,733	245,451	376,116	.....
1957					
Jan.	72,966	14,201	20,963	37,194	116,070

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1954	812,016	461,982	.....	.....	.....	.....	.....
1955							
Dec.	99,946	60,409	.....	.....	.....	.....	123,107
Total	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Jan.	93,562	54,618	79,406	45,747	14,156	8,871	116,520
Feb.	93,533	54,466	80,601	47,606	12,932	6,860	113,616
Mar.	86,941	46,266	75,384	40,869	11,557	5,397	106,491
Apr.	83,320	47,064	72,763	41,449	10,557	5,615	99,573
May	80,138	51,053	69,593	44,424	10,545	6,629	93,677
June	75,635	45,022	66,300	26,791	9,335	5,513	86,247
July	54,340	31,300	45,977	26,881	8,363	4,419	92,078
Aug.	74,422	43,479	62,867	36,759	11,555	6,720	91,883
Sept.	69,380	41,902	59,071	35,534	10,309	6,368	92,553
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1955				
Total	1,008,898	905,867	63,111	.....
1956				
Jan.	89,767	80,116	6,135	58,445
Feb.	91,706	82,244	5,888	57,515
Mar.	96,085	85,094	6,299	65,560
Apr.	90,679	81,333	5,835	68,106
May	89,188	80,105	5,448	58,789
June	78,921	70,260	5,052	55,019
July	60,926	55,027	3,193	59,661
Aug.	77,619	70,479	3,805	56,364
Sept.	72,109	64,887	3,930	56,990
Oct.	81,049	73,058	4,104	54,363
Nov.	72,866	65,022	4,114	52,643
Dec.	65,198	57,929	3,769	56,556
Total	966,113	865,554	57,572	.....
1957				
Jan.	82,020	73,702	4,510	57,393

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1955			
Total	27,854	25,294	....
1956			
Jan.	2,959	2,600	6,237
Feb.	2,977	2,720	6,704
Mar.	3,046	2,842	6,414
Apr.	3,140	2,949	7,137
May	3,021	2,801	7,293
June	2,949	2,765	7,850
July	2,810	2,666	7,937
Aug.	3,059	2,860	8,201
Sept.	3,079	2,863	8,193
Oct.	3,442	3,187	7,893
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	....
1957			
Jan.	3,207	3,017	8,245

PRODUCTION WORKERS

Estimated Number	Dec. 1956	Nov. 1956	Dec. 1955
Ferrous	206,900	205,500	207,600
Nonferrous	67,100	67,000	64,200
Average Weekly Earnings			
Gray Iron	89.01	84.59	84.46
Malleable Iron	85.86	85.44	83.63
Steel	98.87	95.30	95.63
Nonferrous	94.24	90.76	89.57
Average Weekly Hours			
Gray Iron	41.4	39.9	40.8
Malleable Iron	40.5	40.3	40.4
Steel	42.8	41.8	42.5
Nonferrous	41.7	40.7	40.9

Source: Bureau of Labor Statistics

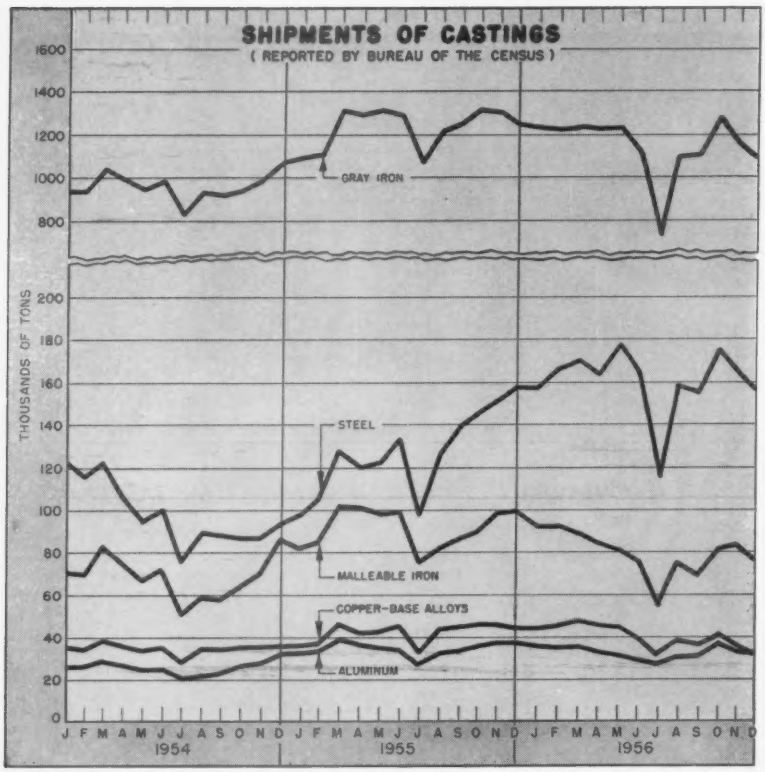
GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1954	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,711	.....
1955										
Dec.	1,259,740	633,993	786,480	328,445	262,056	133,115	30,833	133,935	46,436	1,075,477
Total	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
Jan.	1,249,518	677,017	769,826	326,269	257,150	132,581	32,408	131,346	58,788	1,157,818
Feb.	1,214,769	680,494	739,786	322,956	242,207	128,643	35,074	133,254	64,448	1,140,765
Mar.	1,255,405	715,173	752,498	331,749	254,045	139,625	42,676	132,384	73,802	1,162,578
Apr.	1,218,000	702,145	719,109	314,968	237,486	130,473	39,325	151,670	70,410	1,144,870
May	1,235,631	737,081	702,834	321,413	243,719	131,294	38,419	171,859	78,800	1,086,122
June	1,152,156	686,896	656,778	298,578	217,135	102,405	34,028	170,122	74,093	1,041,315
July	762,611	487,736	509,702	241,771	9,556	7,003	32,484	144,964	65,905	1,109,069
Aug.	1,103,195	671,523	639,953	293,673	170,857	89,589	31,712	180,249	80,424	1,074,461
Sept.	1,109,943	648,784	623,743	282,824	233,823	117,708	35,361	151,081	65,935	1,037,283
Oct.	1,274,734	734,384	749,200	331,069	252,203	134,265	30,978	171,377	70,976	996,351
Nov.	1,175,572	634,856	720,263	303,938	251,262	131,321	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	254,703	136,584	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	2,624,146	1,381,490	406,191	1,746,902	817,762	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1954	1,184,096	880,158	135,581	802,321	580,474	120,309	381,285	303,428	15,315	.....
1955										
Dec.	158,982	122,201	29,003	116,872	88,894	26,919	42,110	33,307	2,084	475,335
Total	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
Jan.	158,618	123,343	27,954	116,092	88,480	26,362	42,526	34,863	1,592	519,401
Feb.	165,398	128,598	30,833	123,279	94,998	29,112	42,119	33,600	1,721	567,330
Mar.	170,045	130,839	31,991	126,583	95,779	29,953	43,462	35,060	2,038	594,990
Apr.	163,708	125,015	27,475	121,723	91,332	25,302	41,985	33,683	2,173	600,242
May	178,227	142,025	35,949	134,919	107,575	33,695	43,308	34,450	2,254	608,275
June	164,661	129,147	31,296	122,483	95,621	28,801	42,178	33,526	2,495	597,103
July	117,984	96,350	19,833	88,971	72,837	18,545	29,013	23,513	1,288	611,233
Aug.	159,831	127,001	32,965	119,025	94,257	30,601	40,806	32,744	2,364	586,496
Sept.	155,046	121,705	33,496	116,905	91,266	31,314	38,141	30,439	2,182	562,937
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1954
1955
1956

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1955			
Total	75,150,247	76,266,385	3,154,052
1956			
Jan.	6,914,836	6,182,704	275,660
Feb.	6,476,135	6,506,044	260,949
Mar.	6,896,593	6,861,698	267,414
Apr.	6,633,363	6,572,836	247,664
May	6,725,396	6,587,030	241,558
June	6,235,691	6,163,668	214,484
July	2,301,442	1,596,570	193,431
Aug.	5,614,997	5,281,627	225,978
Sept.	6,453,229	6,609,309	211,015
Oct.	6,742,483	6,951,386	253,147
Nov.	6,328,272	6,681,074	237,330
Dec.	6,615,935	6,959,900	224,452
Total	73,938,372	72,953,846	2,853,082
1957			
Jan.	6,850,602	7,088,782	240,601

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	20,769
Mar.	28,310	.....
Apr.	25,808	.....
May	23,437	.....
June	18,842	.....
July	17,364	.....
Aug.	23,812	.....
Sept.	20,929	.....
Oct.	23,045	.....
Nov.	21,818	.....
Dec.	18,046	.....
Total for year	274,096	46,450

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1955			
Total	778,000	493,244	.....
1956			
Jan.	68,050	43,750	83,234
Feb.	66,854	42,300	76,283
Mar.	65,760	42,806	73,025
Apr.	58,274	37,518	71,730
May	52,205	33,920	60,634
June	47,775	31,983	61,809
July	42,227	27,301	64,806
Aug.	52,321	33,281	73,411
Sept.	46,340	33,967	79,390
Oct.	65,450	41,943	75,706
Nov.	64,972	39,718	74,623
Dec.	58,111	36,090	75,293
Total	688,339	444,577	.....
1957			
Jan.	67,964	42,189	75,503

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1956	1957
Jan.	195.6	117.9
Feb.	169.0	....
Mar.	152.7	....
Apr.	135.2	....
May	207.0	....
June	156.7	....
July	110.3	....
Aug.	188.3	....
Sept.	114.7	....
Oct.	122.2	....
Nov.	121.0	....
Dec.	115.6	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

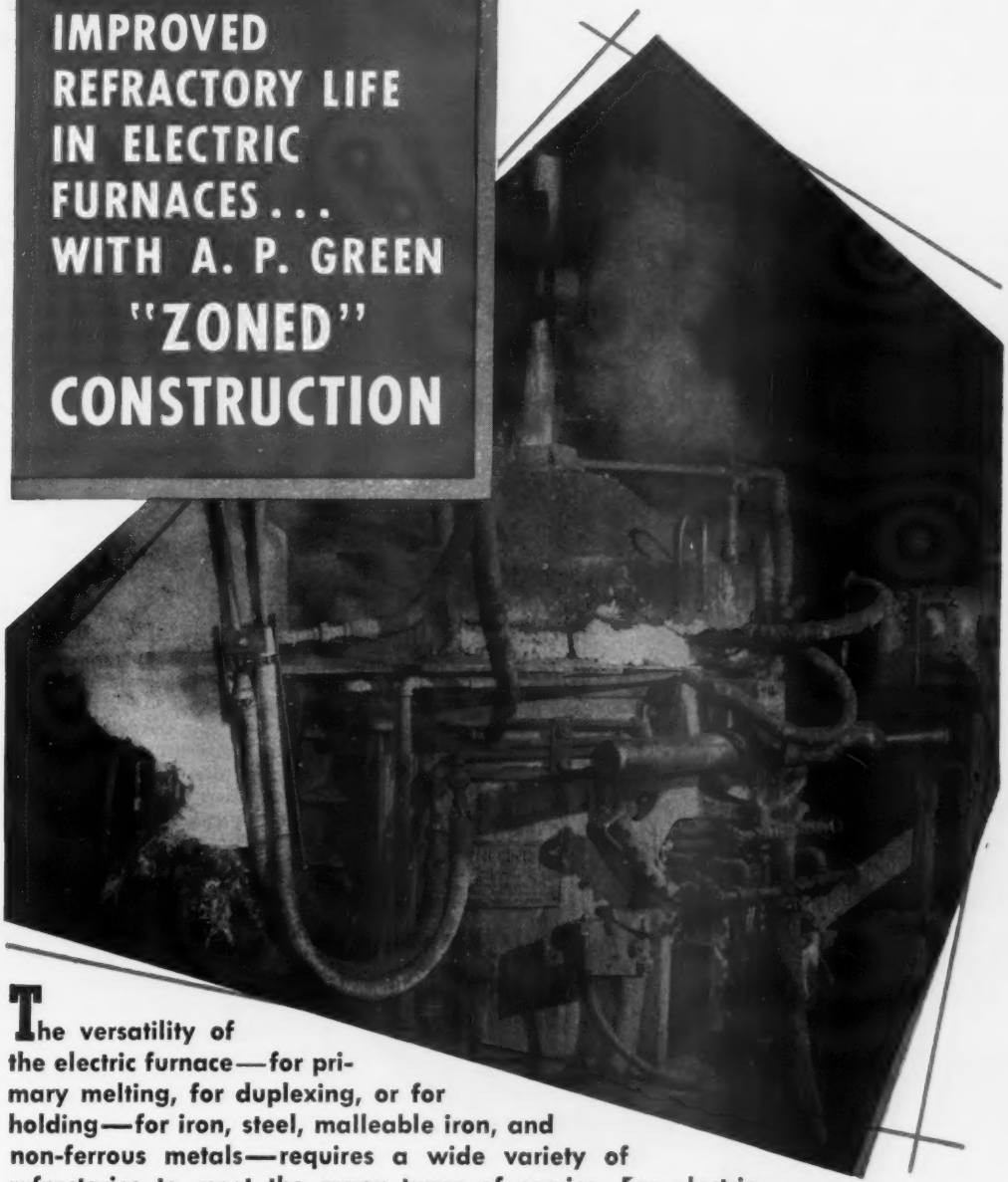
	All Scrap Total	By Types of Furnace—Cupola Total	By Types of Furnace—Air Total	By Types of Furnace—Electric Total
1954	54,780,758	8,542,581	855,207	6,100,444
1955				
Nov.	6,441,351	952,906	112,056	939,971
11 mo.	66,158,129	9,876,282	1,158,034	7,927,189
Dec.	6,496,796	910,675	115,436	830,404
Total	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Jan.	6,688,977	909,201	114,378	880,980
Feb.	6,345,421	892,373	116,418	833,661
Mar.	6,733,076	923,912	101,087	863,950
Apr.	6,490,680	862,233	96,514	842,216
May	6,491,567	855,007	104,485	899,967
June	5,994,989	776,299	87,525	831,456
July	1,986,613	621,064	56,071	399,441
Aug.	5,453,927	803,123	92,200	807,131
Sept.	6,231,017	738,824	84,627	841,783
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
11 mo.	65,444,534	9,094,967	1,050,968	9,011,117

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
Feb.	6,539,199	229,440	370,208	5,350,650	588,901	5,871,824	430,792	24,307	13,010
2 mo.	13,525,144	440,195	687,484	11,156,790	1,240,675	2,147,048	872,426	48,369	24,776
Mar.	7,083,877	196,533	352,856	5,843,852	690,636	6,316,836	427,177	23,737	18,725
Apr.	6,860,833	210,319	333,660	5,623,647	693,207	6,077,074	413,537	22,757	17,179
May	6,873,102	232,375	329,750	5,625,067	685,910	6,064,632	413,494	24,074	28,596
June	6,387,608	213,769	331,871	5,227,488	614,480	5,642,004	379,803	22,039	23,460
July-Aug.	6,191,039	337,077	382,633	4,854,879	616,450	963,749	303,341	14,702	5,582
Sept.	6,873,352	236,809	316,590	5,636,288	683,665	4,618,718	404,948	22,710	17,604
Oct.	7,246,650	245,762	321,188	6,001,279	678,421	6,053,147	366,848	19,642	18,239
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	.....	.....	.....	.....
1957									
Jan.	7,209,547	135,608	344,073	6,081,137	648,699	.....	.....	.....	.....
Feb.	6,596,133	154,543	294,491	5,416,305	730,794	.....	.....	.....	.....
2 mo.	13,805,650	290,151	638,564	11,497,442	1,379,493	.....	.....	.....	.....

*Source: U.S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.

IMPROVED REFRACTORY LIFE IN ELECTRIC FURNACES... WITH A. P. GREEN "ZONED" CONSTRUCTION



The versatility of the electric furnace—for primary melting, for duplexing, or for holding—for iron, steel, malleable iron, and non-ferrous metals—requires a wide variety of refractories to meet the many types of service. For electric furnace roofs, A. P. Green super duty brick, high alumina brick, and monolithic refractories have performed outstandingly in many applications. Even in a specific installation, the service life of a roof may often be materially increased by the judicious combination of several types of refractories. Such "zoned" construction offers maximum economy.

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Future Trends in Needs of Metals Will Be Upward

Ways for More Efficient Consumption Are Sought

By J. J. Kanter*

DEMAND for metals of all kinds seems insatiable. An examination of metal statistics since the beginning of the machine age reveals a generally increasing trend of per capita metal consumption. The outlook for metal production during the next two decades, in view of expanding populations, rising standards of living and defense needs is for further increases.

The idea that metals compete for markets seems not to apply when we are engaged in a technology race. Since the availability of metals has become generally inadequate to meet the world demands, their applications are rapidly undergoing the adjustments which afford the most economy and effectiveness.

The business of stretching the limited supply of metals to best advantage comes about through much painstaking effort between makers and users to arrive at specifications which maximize performance at the least expenditure of scarce material. This process involves a complex business of finding substitutes followed by researches on substitutes for the substitutes.

But what can be said of a specific nature about metals and their uses 20 years hence? The 20-year crystal ball is quite cloudy and reveals only truisms. Nevertheless, business men contemplating investments in facilities today which will not be amortized for another 20 years or more must base their gambles on the "outlook" as it is popularly called in the best treatises from Washington. A most ambitious report of this nature was published in June, 1952, known popularly as the Paley Report covering "Resources for Freedom." This report of the President's Materials Policy Commission is in five volumes.

Another notable source book of data was published in 1956 by the Staff of the Bureau of Mines—"Mineral Facts and Problems," Bulletin 556.

All projections of future commodity requirements start with a discussion of the population problem and seem generally to agree that by 1976 the U. S. population and labor force will be about 30 per cent greater than it is today. Thus it is reasoned that

*Directing engineer, Engineering Laboratories, Crane Co., Chicago. This paper was presented at a meeting of the Chicago District, American Society for Testing Materials.

if the standard of living is to be maintained or improved the production of such commodities as metals must increase, be used more efficiently or be substituted for.

Steel Capacity To Climb—Since the end of World War II, world steel production has more than doubled and is currently at the rate of about 300 million net tons annually. The U. S. rate is 117 million net tons, the Free World 230 million net tons and Iron Curtain 70 million net tons. The U. S. increase in this period has been about one-third. The Free World increase is about 60 per cent, while the Iron Curtain steel production has nearly tripled. By 1976 experts tell us the U.S. production will be 160 million net tons annually, an increase of about another one-third over the current rate. The world total by that time is expected to reach about 400 million net tons.

Our nation has been well aware that because in a number of metals our economy is not domestically self-sufficient, a policy of government stockpiling of such metal is operating for security reasons. Among the metals provided for in this stockpile, either by retaining the metal itself or its ore are aluminum, antimony, bismuth, cadmium, chromium, cobalt, columbium, copper, gold, lead, magnesium, manganese, mercury, molybdenum, nickel, platinum, tantalum, tin, titanium, tungsten, vanadium, and zinc. Although all these materials are available domestically in some degree, none is in the abundance needed for drastically expanded uses.

Nickel—Shortage of this metal became acute in World War II, during the Korean War and again in the industrial upswing late in 1954. Each of these shortages occasioned government allocations and started drives for nickel substitutes. The Free World nickel supply in 1956 was 428 million pounds of which the U. S. share was 70 per cent. A future availability of 500 million pounds annually is in view, but whether the U. S. share will stand at 70 per cent is problematical. As the rest of the world industrializes, it becomes more and more of a trick for our 6 per cent of the world's population to consume the lion's share of any of the choice commodities.

Tungsten—Without adequate tungsten our modern high-production economy would be dangerously embarrassed for cutting tools. Tungsten consumption is something of an index to steel consumption. After China went into the Iron Curtain, the stockpiling of tungsten was undertaken in earnest. Since 1952 our imports of tungsten have exceeded consumption by three to one although our domestic production is more than adequate to take care of current needs. We have enough tungsten on hand for 20 peacetime years. The stockpiling program, however, would seem to provide for eventualities gradually increasing consumption of tungsten from the 6 million pounds in 1956 to 16 million in 1976.

Aluminum—The most spectacular metal growth is that of aluminum. Since the outset of World War II aluminum production has increased from 300,000 net tons annually to more than 1½ million. The end of this increase is nowhere in sight. A need of 2 million tons is estimated by 1960 and for 1976 we must concern ourselves with the bauxite reserves, the source of the metal.

Only a fraction of our bauxite is domestic, large requirements coming from the West Indies and South America. According to the Bureau of Mines, from 1943 to 1953 self-sufficiency in bauxite declined from 80 per cent to 26 per cent. The world reserves of bauxite are estimated at 1.6 billion metric tons, about 100 times the current production. Our

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domestic reserves are only about 2½ per cent of the total. Fortunately, however, a large proportion of the reserve is in the Western Hemisphere and accessible to the U.S. and Canada.

Copper—World production of primary copper amounts to about 3 million short tons annually, an increase during the postwar period of about 20 per cent. Total production of copper since earliest records were kept is about 47 million short tons. This cumulative total is of interest in the case of copper because of its high degree of recoverability. The secondary production of copper in U. S. amounts to about 1 million tons annually, about two-thirds of our copper consumption. About one-third of the copper is used for electrical purposes, a field in which aluminum has made some inroads as a substitute. The outlook for the next 20 years is that copper consumption will stabilize around 1,600,000 tons for which about 500,000 tons will have to be imported.

Titanium—This metal occurs abundantly in nature, being exceeded only by magnesium, iron, aluminum and silicon among the metals. It occurs in many iron ores, black sands, and in oxide form as rutile. Although it has been available in ferroalloy form for more than a generation and used as an addition agent in steelmaking, interest in titanium as a base metal dates from the development of the DeBoer and Kroll processes rendering it pure enough to be ductile. Much effort and ingenuity has been applied to the problem of reducing the cost of titanium and its alloys to a point where they compete with or augment the supply of metals and alloys combining high strength-weight ratios with corrosion resistance.

In the eight years since the government has actively assisted in the development of titanium technology and production, it has become feasible to make and market first class sponge metal at $3 a pound. This is good progress when contrasted to the long period of development required before aluminum and magnesium became economical structural materials, although the techniques of producing structurally satisfactory titanium is incomparably difficult and exacting. It requires know-how in the use of high vacuums and noble gas atmospheres (helium, argon) and a high level of chemical engineering skills. Production of a pound of sponge titanium requires the expenditure of either a pound of magnesium metal or 2 pounds of sodium metal as reducing agents. This pound of sponge also carries the burden of a pound of steel used in recovery equipment.

A pound of titanium alloy mill product is apt to carry as much as a 2-pound sponge metal burden, since the problem of satisfactorily revolving titanium scrap is yet to be solved.

What will the tonnage of titanium become in the next twenty years? Granting solutions to the technical problems with which the industry wrestles, again the strategic consideration of raw material is with us. As yet the most desirable starting material is rutile (TiO_2), of which about 2 pounds is needed for a pound of titanium sponge. Promising efforts are being made to obtain a satisfactory oxide from the slagging of the titaniferous magnetites.

Manganese—World production of manganese ores has nearly tripled since World War II, currently being in excess of 10 million metric tons or about 1 per cent of estimated reserves. Like bauxite at current rate of production, known reserves are enough for 100 years.

U.S. consumption, however, has been running about 36 pounds of manganese ore per ton of steel, which on 1976 steel production estimates

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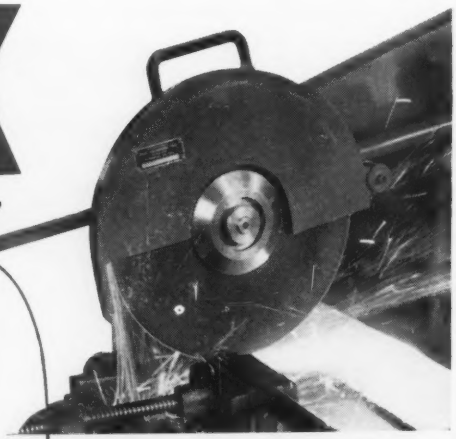
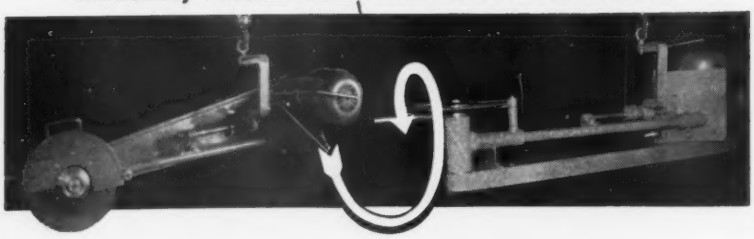
CUT-OFF MACHINE



FOR FAST REMOVAL OF SPRUES AND RISERS FROM BRONZE, ALUMINUM AND IRON CASTINGS!



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should be on the order of 3 or 4 million tons. Domestic production of manganese requirements has been less than 10 per cent, about 25 per cent coming from Western Hemisphere sources and the balance from Africa and India. Our steel rate production during the next twenty years could use up the entire domestic ore reserve, about 35 million tons. Thus if we are to continue using one-third of the world supply, we will remain dependent on large imports of manganese ore.

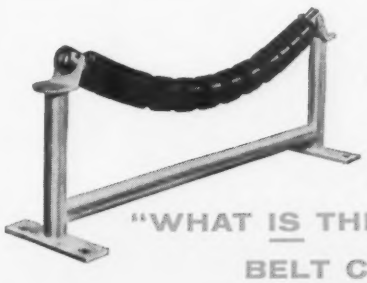
Magnesium—Magnesium is an attractive metal from the raw material supply standpoint. It is the lightest structural metal we have. Since it can be extracted from sea water, the world has a virtually inexhaustible supply of magnesium. Its extraction, however, requires either low-cost electric power for electrolytic extraction, or high-grade ferrosilicon for thermic extraction which in turn also derives from low-cost electric power.

During World War II considerable capacity for producing magnesium metal was created, bringing rated capacity to nearly 300,000 short tons annually. In 1944 we consumed 133,000 tons of this metal. In 1947 consumption dropped to 7000 tons but by 1953 it had risen to 50,000. Part of the recovery of use during the 1947 to 1953 period can be laid to its use, in the production of titanium metal by the Kroll process. The current Kroll titanium annual capacity is about 15,000 tons, requiring something like 20,000 tons of magnesium metal to keep it engaged. The prospects for a gradually expanding market for magnesium in the next twenty years are very good.

The Atomic Age—The metallurgy of nuclear requirements already has become an involved subject. The next twenty years in this field are sure to bring about metal requirements unpredictable today. The fissionable metals sources were unknown twenty years back. To obtain fissionable uranium it was necessary to engineer vast plants for isotopic extractions. Through the creation of neutron capturing piles or reactors the production of the man-made metallic element plutonium was realized. Processes for the extraction of fission products have been multiplying and already numerous scientific and industrial uses for these isotopes have come about.

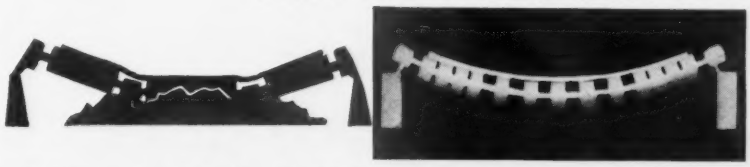
Notable among the fission products is cobalt 60, an isotope with half life of 5.3 years, which has already revolutionized industrial radiography. Thorium as well as uranium is now intensively studied metallurgically toward its use as a nuclear power fuel element. The Navy and the power industry are embarked on vast programs of creating nuclear reactors to give atomic power, the realization of which introduces impressive requirements of zirconium and hafnium. Zirconium is needed as a structural material in reactors because it does not seriously interfere with neutron efficiency, and hafnium is needed because of its opposite effect and consequent effectiveness in control devices.

Curiously, the same mineral deposits which yield thorium are apt to contain titanium, zirconium and hafnium. Along with these some 16 to 18 so-called rare earth elements are turned up. The rare earth metals are also finding impressive jobs to do in atomic energy realization as well as in other fields. A whole vast field of reactive metals technology is rapidly evolving and in the next twenty years will make such special equipment as noble gas reactors and vacuum furnaces quite commonplace. The eventual availability of economic atomic power is expected to react over all fields of metal production, even that of steel.

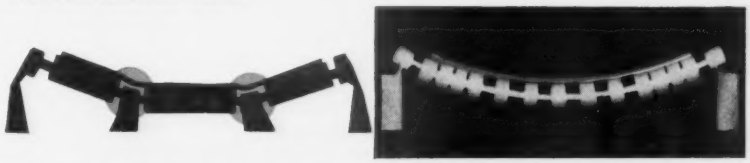


We've been asked...

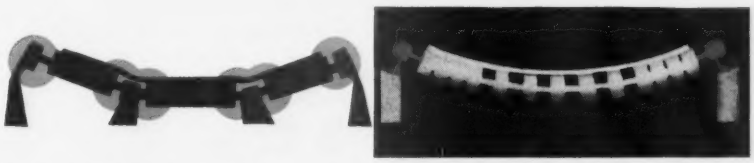
"WHAT IS THE JOY LIMBEROLLER BELT CONVEYOR IDLER?"



Radically different from all other idlers, the Limberoller is a flexible steel cable suspended between two bearings . . . neoprene discs are molded to the cable . . . forming a single roll idler which turns on its own axis. This imparts a flexing action which is self-cleaning . . . prevents material buildup, a source of trouble with conventional idlers.



Supports the belt throughout its entire width . . . doesn't have the unsupported gaps left between the rolls like conventional idlers. Increases belt life 20% and more. Materials don't "bump along" from idler to idler, either.



Two bearings, instead of six. They are up out of the dirt zone, not hiding down under the belt. Joy has never replaced a single bearing due to normal failure. Heard enough? There's more . . . get the whole story from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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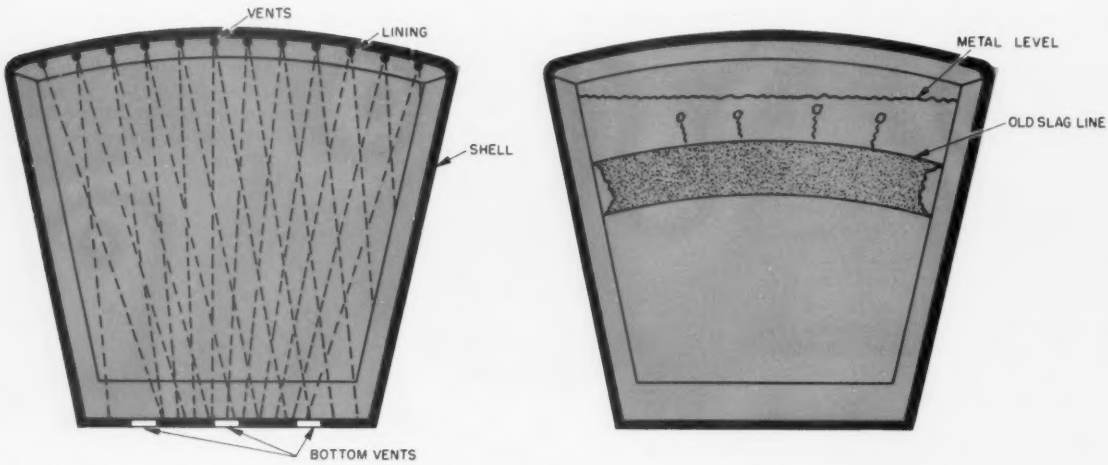
Trouble Shooting

By C. W. AMMEN



Drawing on left shows how ladle lining is vented. Right drawing shows how chips of oxide at slag line are dislodged and float into the metal

Care of Ladles

Dear Charlie:

Making bushings, we often come across a string of clean, bright yellow holes running straight up the side from a larger fellow to a little one. I am sure you have seen such holes—some fellows call them ducks or bird flights. Bushings affected this way are clean otherwise, with no indication of gassed metal, heads, shrinks, etc. Bushings from the same heats or even the same ladle will be O.K. Some fellows say this effect is from sand from the ladle or crucible. At any rate, it comes and goes, driving us nuts.

Sincerely,
Sam

Dear Sam:

You are so right! I have a first-hand speaking acquaintance with this type of defect and have spent my share of sleepless nights pondering the cause. Although in most cases it does not affect the casting in regard to pressure tightness, it looks bad and often requires that the casting be scrapped after costly machining.

This defect is caused by a piece of copper or tin oxide, usually copper oxide, entering the stream of metal and motorboating along as it reduces itself into or tries to become deoxidized metal. Thus we get the diminishing size of the holes as it gives off its oxygen.

Some expound the theory that these fellows are caused by a wee bit of slag going in with the metal. For the most part, however, the slag is neutral and is not the offender. The most likely source of the oxidized metal is the ladle or the crucible; in a few instances, it may be a dirty, oxide-covered stirring bar or rod. When a ladle is used for pouring, too little or no attention sometimes is paid to its drying, care, use, etc. So prior to getting into any more about where these ducks come from, let's start from the beginning and consider the ladle. This might sound like a lot of trouble to go through—make no mistake about it.

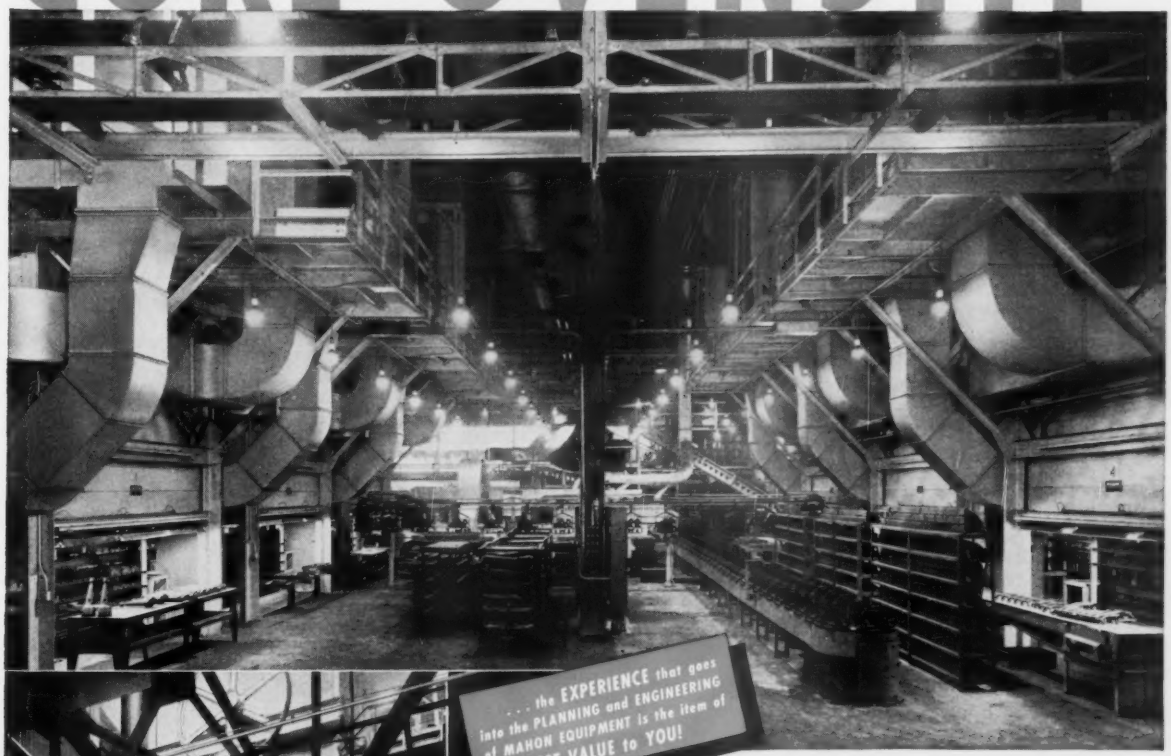
Numerous ladle-lining materials are available to the foundryman; for the most part, the one you use is a matter of personal choice. The shell should be clean, free from excessive rust and in shape as far as dimensions and contour are concerned (not banged out of shape badly). Sufficient vent holes should be drilled in the bottom to allow for steam to vent off. If steam pockets occur behind the lining, it leads to gassed metal and cracked or broken linings.

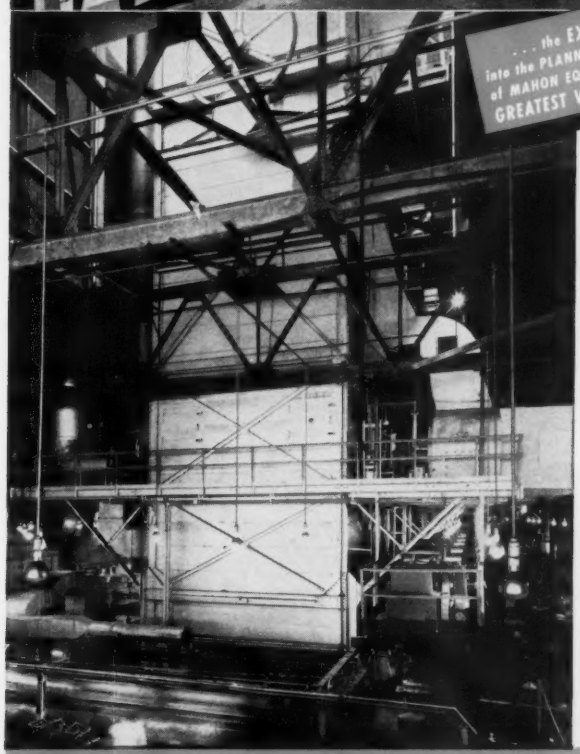
The shell is washed all over inside with molasses or linseed oil, then weighed accurately and the weight recorded. The lining material is tempered to the driest workable condition possible. Three samples are taken and the per cent of moisture by weight determined. The lining material is mixed well and used to ram up the shell to the correct thickness with respect to shell size. Avoid overlaps, dry laps, etc. It is a good idea to have all ladles lined by the same man to obtain consistent results.

When the lining has been completely installed and shaped, run a vent wire down from the top, next to the shell, all around in one direction, on an angle to the bottom, then around the other way, changing the angle so as to cross-hatch the venting. The size of the vent wire and the number of vents should be determined by common logic and the size of the ladle. If it is your practice to wet black linings, do so only after 80 per cent of the moisture has been removed since moisture tends to lower the permeability of the lining and make drying difficult.

The ladle should be dried overnight in the core oven or placed in a dry warm place long enough to remove

CORE OVENS...





In some of the largest and most modern foundries in the world you will find Mahon Core Ovens and other equipment. The illustrations above and at left show part of a battery of twenty-six Mahon Vertical Core Ovens installed in the foundry of one of the world's largest automobile manufacturers. If you are contemplating new core or mold baking ovens, or core dip and paste drying ovens, you will want to discuss your requirements with Mahon engineers . . . because, you, like many others, will find that Mahon engineers are better qualified through experience to advise you on the type of oven best suited to your particular needs. And, if you wish to compare, you will also find that Mahon Core Ovens, like all other Mahon equipment, are better engineered and better built for more economical operation over a longer period of time—a point you will want to investigate thoroughly before making a capital investment in new production equipment. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-657. And remember, it costs you nothing to discuss your baking and drying equipment requirements with Mahon engineers.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES ENGINEERING OFFICES in NEW YORK and CHICAGO

Engineers and Manufacturers of Core and Mold Baking Ovens, Core Dip and Paste Drying Ovens, Mold Spray Booths, Mold Racks, Core Rack Trucks, Sand Storage Bins and Hoppers, Shake-out Hoods, Cooling Tunnels, Dust and Fume Control Equipment and Filtered Air Supply Systems, Metal Cleaning Machines, and many other units of Special Processing and Production Equipment.

MAHON

the minimum 80 per cent of the moisture before it is placed under a ladle heater or any forced heating unit. This practice is somewhat drawn out, but it will increase the life and usefulness of the ladle as much as 300 per cent. It also will prevent excessive cracking. Should the lining crack or check during the initial drying, you will know that the drying was done too fast, with too much heat or with excessive moisture in the mix. Ladle-lining mix should not be tempered much more than molding sand. Cracks are patched by rubbing in ladle mix which is as dry as possible.

Avoid High Shrinkage Materials

Avoid the use of materials with high shrinkage. Some materials contain a binder which assists in lining the ladle and holds it together until a ceramic bond can be attained. With this type, after the initial oven or air drying, the ladle should be brought up to vitrification temperature the first time it is fired. If it is brought up only to a point where the bonding agent is destroyed, but not hot enough to give a ceramic bond at the first firing, the lining may be lost or may give poor service.

After the initial slow drying and a trip under the heater to a good, high, cherry-red heat, the ladle is allowed to cool, then weighed to determine whether it is dry enough for use. Do not confuse a hot ladle with a dry ladle. A ladle that is cherry red and hot enough for pouring also can be a wet ladle which will gas the metal. The metal does not have to boil visibly or kick in the ladle to produce gas. I have seen too many castings lost because of a wet ladle which seemed to be hot and dry.

Weigh the ladle to establish dry and wet weights. Don't confuse them with cold and hot conditions. When the ladle is put into service, fill it to the point you would call full and use it that way if at all possible. Come back to the original slag line each time the ladle is filled or used. If the lip is broken and has to be patched, patch it and take it out of service until the patch is dry. Much scrap is caused by pouring over a wet lip patch.

In some mighty fancy shops, I have seen a pourer patch a missing spot or crack at the lip and go right to work. If the patch stays on at all, the metal going over it probably will get a first-class steam treatment—sometimes for three or four loads. Keep sufficient dry ladles on hand. A cold, dry ladle is safer to use than a hot, wet one. You can, in a pinch, heat a ladle with hot

Here are our published performance specifications for Federated Tenzaloy: Castings aged 10-14 days at room temperature.

Yield strength	35,000 psi
Tensile strength	25,000 psi
Elongation (in 2 in.)	4-5%
Brinell Hardness No.	74
Impact strength (Charpy in ft.-lbs.)	
Notched	3
Unnotched	14
Electrical Conductivity	35%

FEDERATED products:

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metal, but don't try to dry and heat with metal. When bringing a new ladle into play, put it on the scale and check for sure. All ladle bowls should, for many reasons, have a serial or identification number or mark.

Foundry A may use the same ladle lining material as Foundry B, for example; yet A says the stuff is no good and B reports wonderful results. Foundry B simply knows how to apply and use the material.

I didn't mean to say so much and to run away from your problem. When hot metal covers an old slag line, it can work loose bits of slag and oxide which can get into the stream and the casting. Use clean ladles and do not cover the original slag line. Place phosphor copper in the bottom of the ladle, and be sure to allow for a complete reaction before pouring.

Sincerely,
Charlie

Four More Companies Join the Material Handling Institute

Membership in the Material Handling Institute Inc. was expanded to 80 recently when American Chain & Cable Co., Economy Engineering Co., Little Giant Products Inc., and Whiting Corp. joined the national organization. The roster contains 70 manufacturing members and ten associate members.

Member companies' official representatives in MHI are S. J. Woodworth, sales manager, Wright Hoist Division, American Chain & Cable Co.; E. W. McDonnell, sales manager and chairman of the board, Economy Engineering Co.; H. G. Sharp, president, Little Giant Products Inc., and G. E. Seavoy, vice president, Whiting Corp.

Names Herman-Ashby Co.

Oswald Refractories Co., St. Louis, has named Herman-Ashby Co. as its representative on the West Coast. G. N. Herman and R. A. Ashby are located in Altadena, Calif., and San Rafael, Calif., respectively. Herman-Ashby Co. will handle sales and service work in connection with products of the following companies with whom Oswald Refractories is associated: Wellsville Fire Brick Co., Alsey Brick & Tile Co., Oswald Insulating Brick, Samuel Chrome Refractory Products, Kittanning Brick Co., and Eagle-Picher Co.

Do you hear meaningless claims when you buy self-aging Aluminum Alloys?

Federated Tenzaloy is the most widely used of all high-strength, self-aging aluminum alloys because it has the highest yield strength, and it has the best all-around combination of properties. Yield strength is the true measure of a metal's ability to take punishment, regardless of other claims that are made.

When you buy Federated Tenzaloy, you can be sure it will perform as well as its specifications indicate. Tenzaloy is produced under the supervision of ASARCO's Central Research Laboratory, where refining and testing techniques control impurities to parts per million, if required.

Hundreds of foundries and manufacturers use Tenzaloy where heat treating is impractical because of casting design or size. Hundreds more cast Tenzaloy because heat treating facilities are not available.

Why not ask your Federated field man to tell you who uses this metal and how? He will be around to see you soon, and it will benefit you to talk to him.

Federated Metals

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

Circle 666 on Inquiry Card—Page 51

Stockholm Prepares for

International Foundry Congress

FOUNDRYMEN from all over the world will gather in Stockholm, Sweden, this year, on Aug. 19-24, for the 24th International Foundry Congress. Organization of the congress has been entrusted to Sveriges Mekanforbund, the Swedish foundry association, in collaboration with the foundry associations of Norway, Finland and Denmark.

Activities at the congress will include technical papers, works visits, tourist trips, a ladies program and postcongress tours. After the opening of the meeting on Aug. 19, Prof. Erik Rudberg, Swedish Institute for Metal Research, will deliver the opening lecture on "Theory and Experience." Technical sessions will be held on Aug. 21 and 23, and Aug. 20 and 22 will be devoted to works visits.

For the latter, buses will take visitors to plants in the vicinity of Stockholm. More distant foundries will be traveled to by special trains, and one airplane trip to Finland will be offered if interest is great enough. A trip to the Archipelago of Stockholm will be offered on Aug. 24. A special group of events for the ladies will be offered on Aug. 20, 21, 22 and 23.

Postcongress tours of the traditional type will not be arranged, but the Congress Committee has made certain arrangements for visitors to facilitate their making combined study and holiday tours. Agreements are being made with a large number of foundries in Sweden, Denmark and Norway to receive visitors. In addition, receptions for foreign guests will be arranged in Oslo, Norway, and Copenhagen, Denmark, in the middle of the week after the congress.

The Finnish Association, Finlands Metallindustriforening-Suomen Metalliteollisuusyhydistys, also will arrange a tour to Finland. Participants in this tour will leave Stockholm for Helsinki by plane on Aug. 24, and the trip will include sightseeing, works visits and a reception. The tour will end in Helsinki.

The extensive ladies program includes sightseeing tours, visits to special attractions, lunches and a fashion show. Ladies also are invited to take part in their husbands' trips to plants outside of Stockholm and in Finland. On these trips they will take part in special programs in each locality while their husbands visit foundries.

Headquarters for the International Foundry Congress will be the Parliament Building, which is located conveniently in the center of Stockholm

A total of 12 separate tours will be available on the works visits programs on Aug. 20 and 22. Each tour will require the full day, and with two exceptions, each tour is to one foundry. These foundries include plants casting gray iron, steel, malleable iron, nodular iron, brass and light metals in many sizes and for varied applications. Types of molding employed at these foundries include sand, die, permanent mold and centrifugal. Since many of the Scandinavian foundries are highly mechanized and use advanced metallurgical methods, the Congress Committee is sure that the plant visitations will be worth while.

View from the arcades of the Stockholm Town Hall, where the congress banquet will be held

Technical sessions and meetings of the International Committees will be held in the center of Stockholm, in the Houses of Parliament, which will be headquarters for the congress. Technical papers number several dozen and cover a wide range of subjects. They will be delivered with simultaneous translations which will make it possible for the audiences to follow the proceedings in English, German or French.

A congress bureau, a travel bureau, a bank and other aids for the benefit of congress participants have been arranged.

The general program follows:

Sunday, Aug. 18

12 noon to 7 p.m.—Congress Bureau opens.

Monday, Aug. 19

8:30 a.m.—Congress Bureau opens.

10:15 a.m.—Inauguration of the 24th International Foundry Congress. Greeting addresses and address by the president of the International Committee of Foundry Technical Associations. His Royal Highness, Prince Bertil of Sweden has expressed his hope that he will be able to be present. Prof. Erik Rudberg, Swedish Institute for Metal Research will present the grand opening lecture, "Theory and Experience."

2:30 p.m.—Sightseeing in Stockholm, either by boat or by bus. The International Dictionary Committee and the International Committee on Foundry Defects will meet in the afternoon.

7:15 p.m.—"Skansen evening," an informal gathering, has been arranged for the participants and their ladies at Skansen, a famous open-air museum and park. Dinner will

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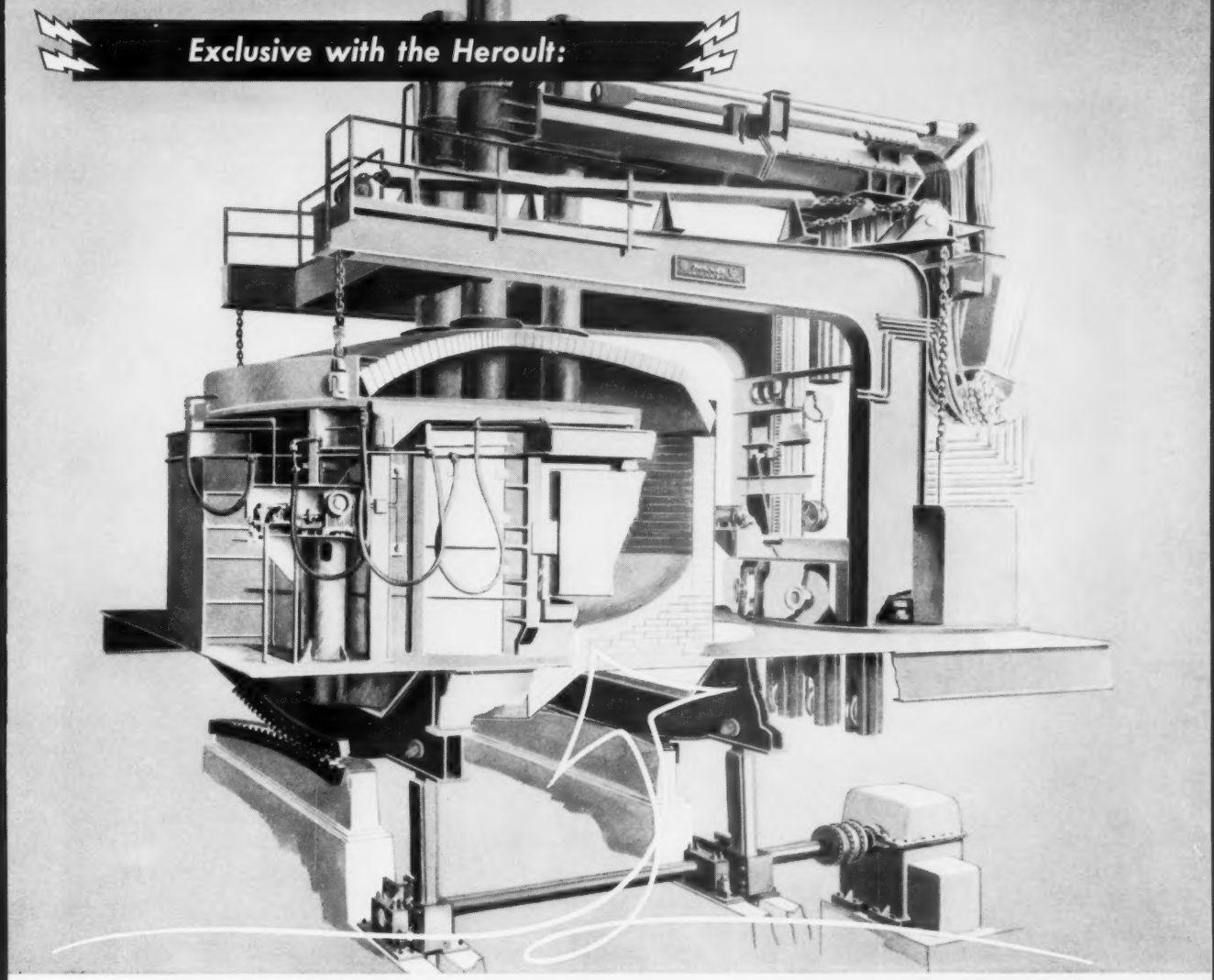
Exclusive with the Heroult:



Flat Bottom Shell

THE EXCLUSIVE Flat Bottom Shell construction of Heroult's NEW electric furnace facilitates installation of the hearth lining, resulting in lower refractory costs and shorter down time for relining.

The advanced Flat Bottom design of the NEW Heroult furnace provides maximum protection against burnout.

Flat Bottoms also permit the use of thicker refractories at the sides of the hearth, resulting in more uniform bath temperatures, essential for the production of quality steels.

The simple, rugged supporting structure possible with the Flat Bottom Shell makes the removable shell feature economically feasible.

NEW Heroult furnaces are available in a range of sizes capable of holding capacities from 6,000 to 400,000 pounds. You can select door charge or top charge models, with gantry or swing top moving roofs; there is available special induction stirring equipment and duplexing and non-ferrous furnaces.

Heroult's specialists can advise you on the furnace best suited to your needs—and they can install it for you.

For the finest electric furnaces available anywhere, look into the exclusive features of the Newly Designed Heroult. Our nearest contracting office can supply you with complete details.

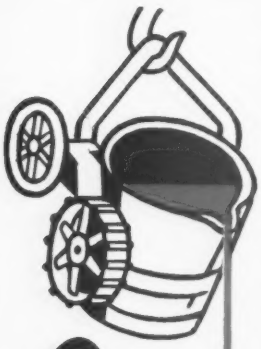
Heroult
ELECTRIC
MELTING FURNACES

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES:
525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in: AMBRIDGE • ATLANTA • BALTIMORE • BIRMINGHAM • BOSTON • CHICAGO CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • ELMIRA • GARY • HOUSTON LOS ANGELES • MEMPHIS • MINNEAPOLIS • NEW YORK • ORANGE, TEXAS • PHILADELPHIA PITTSBURGH • PORTLAND, ORE. • ROANOKE • ST. LOUIS • SAN FRANCISCO • TRENTON UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

HARDY



To have *control* of uniformity and product characteristics, to improve casting finishes, to cut down delays and losses from casting defects — specify Hardy *Controlled* Foundry Sands. These are the finest foundry sands available. They are the products of continual laboratory testing and research, long experience, and the skills of informed sand technicians. Write or call us for the assistance of a Hardy foundry engineer to help you with any molding or core problem.

Controlled FOUNDRY SANDS

The Hardy Sand Company produces Natural Bonded Sands, Washed Silica Sands, Bank Sands, and are distributors for Mold-Rite, Western Bentonite, Southern Bentonite, Wood Flour, and Refract-O-Mold Spray.

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WISCONSIN, MINNESOTA, WESTERN MICHIGAN
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CHICAGO—Goebig Mineral Supply Company
CALIFORNIA—Grant & Company, Los Angeles
WESTERN CANADA—Shananan's, Ltd., Vancouver, B. C.

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Producing controlled foundry sands for over fifty years.

HARDY SAND COMPANY

POST OFFICE BOX 476 EVANSVILLE 3, INDIANA

follow a program of folk dances and songs.

Tuesday, Aug. 20

All day—Works visits. Evening free.

Wednesday, Aug. 21

9 a.m.-12 noon—Technical sessions in two rooms simultaneously.
2-5 p.m.—Technical sessions. Meeting of the International Committee for the Testing of Cast Iron.
7:30 p.m.—Banquet at the Stockholm Town Hall.

Thursday, Aug. 22

All day—Works Visits. Meeting of the Past Presidents Committee and the International Committee of Foundry Technical Associations. Evening free.

Friday, Aug. 23

9 a.m.-12 noon—Technical sessions in two rooms simultaneously.
2-4:40 p.m.—Technical sessions.
4:30 p.m.—Official closing ceremony. Addresses by the presidents of the congress and of the International Committee. Presentation of the Olivo Prize.
9:30-10:30 p.m.—Midnight concert of Scandinavian music at the National Museum. Opportunity to see the national art collection.

Saturday, Aug. 24

10 a.m.—Excursion by steamer to Lake Malar. Visit to Bjorko, on which is the site of Birka, a town which flourished as a famous commercial center during the time of the Vikings, more than 1000 years ago. Return to Stockholm at about 4 p.m.

British Foundrymen Complete Plans for Annual Conference

The Institute of British Foundrymen will hold its fifty-fourth annual conference at Harrogate on June 18 to 21 in the Majestic hotel under the auspices of the West Riding of Yorkshire branch of the institute. The tentative program follows:

Tuesday, June 18

Afternoon—**Council and committee meetings**
8.30 p.m.—**Reception,** Lord Mayor of Harrogate and the Mayoress followed by dancing and entertainment

Wednesday, June 19

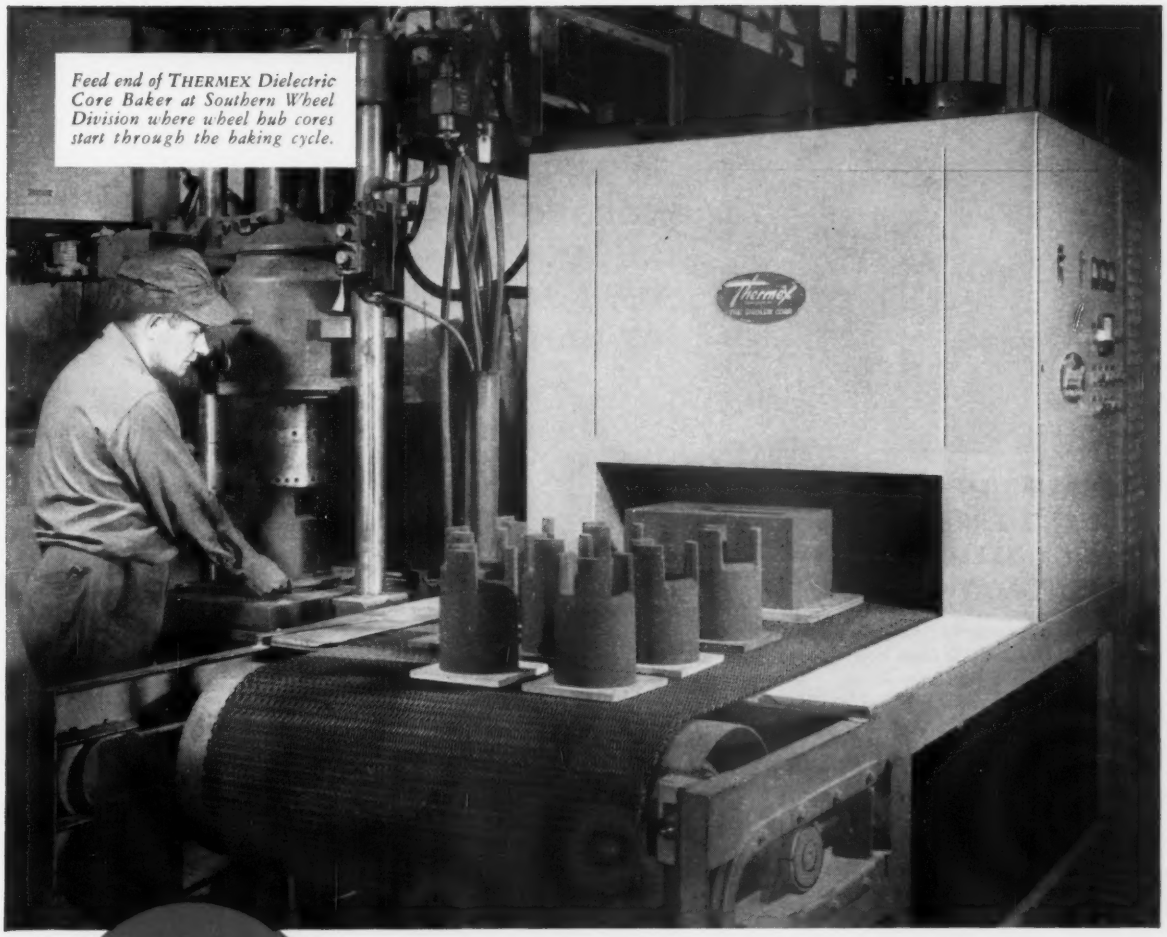
9:15 a.m.—**Annual general meeting. Presentation of awards**
11:00 a.m.—**President's address,** J. Blakiston
11:30 a.m.—**Edward Williams lecture,** Sir Frederick Scopes, **Thoughts on the Future of the Ironfoundry Industry**
12:45 p.m.—**Luncheon**
2:30 p.m.—Session A—**Production Problems in the Manufacture of Alloy Iron Castings,** W. Martin Lord; **Machine Tool Castings,** G. W. Nicholls; **Aids to Production in the Jobbing Foundry,** I. Rees and D. H. Snelson.
Session B—**Metal Losses in Crucible Melting Practice,** R. S. Jackson and D. W. Brown (British Non-Ferrous Metals Research Association paper); **Observations on the Melting and Casting of Aluminum Bronze Alloys with Special Reference to Test Bars;** C. V. Wilson and E. V. Tull.
7:00 p.m.—**Reception,** the president of the Institute
7:30 p.m.—**Annual banquet**

Thursday, June 20

9:30 a.m.—Session C—**The Maintenance of Foundry Plant,** L. R. Evans and P. W. Pegg; **Cupola Developments,** (Report of Sub-committee T. S. 43 of the Technical Council); **The Hot Blast Cupola as an Economic Unit for Producing Castings to B.S. 1452, Grade 12,** J. Hendershot.
Session D—**Surface Sinking Defects in Gray Iron Light Castings,** I. C. H. Hughes (British Cast Iron Research Association paper); **Cast Iron Tests and Specifications** (Report of Sub-committee T.S. 37 of the Technical Council).
2:30 p.m.—Session E—**Injection Processes in American Foundries,** G. P. Dahm and C. E. Bieniosek (American Foundrymen's Society exchange paper); **Mold Drying** (Report of Sub-committee T.S. 39 of the Technical Council); **The Utilization of Oil Fuel in Foundries,** L. Marsden.
Session F—**Features of the Metallurgical Properties of Steel Castings,** W. J. Jackson (British Steel Castings Research Association paper); **Heterogeneous Distribution of Oxygen in Cast Iron,** G. Blanc and M. Blondel (L'Association Technique de Fonderie exchange paper).
7:30 p.m.—**Excursions** followed by buffet supper

Friday, June 21

9:00 a.m.—**Plant visitations**
8:00 p.m.—**Dinner dance** and cabaret



Feed end of THERMEX *Dielectric Core Baker at Southern Wheel Division where wheel hub cores start through the baking cycle.*

Thermex®
ELECTRONIC CORE-BAKING EQUIPMENT

Produces high quality, low cost cores for American Brake Shoe Company

The modern plant of The Southern Wheel Division of American Brake Shoe Company at Calera, Alabama, is designed for continuous-flow production of cast steel freight car wheels. THERMEX* Core Baking Equipment contributes to the high output, low cost operation of this plant.

This progressive firm specified high-speed THERMEX Core Baking Equipment because it is capable of producing the high-precision, properly cured cores essential to sound castings. With this dielectric equipment, every grain of sand gets the proper amount of heat. This uniform heating eliminates over-heating and distortion — results in smoother, more accurate castings. The equipment cuts costs in many ways, too—in man-hours, in rejects, in floor space required.

If you're searching for ways to improve your product and cut costs, investigate THERMEX Core Baking Apparatus. A letter or a phone call to The Girdler Company, Thermex Division, Louisville 1, Kentucky, will get you all the facts.

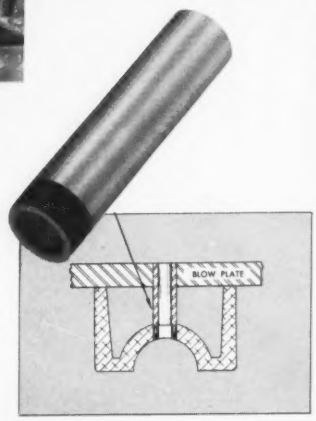
*THERMEX—Trade-Mark Reg. U. S. Pat. Off.

The GIRDLER Company
A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY
THERMEX DIVISION

HOW MUCH TIME IS WASTED IN YOUR CORE ROOM KNOCKING OFF STEMS BY HAND?

SAVE TIME BY LETTING SAND ARRESTER® TUBES PICK STEMS OFF AUTOMATICALLY!

Call your foundry supply house for enough tubes to fit one box. No obligation—Results guaranteed.
Write for free catalog covering full line of core box protection.



MARTIN ENGINEERING COMPANY
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FOUNDRY PRODUCTS

MINERS • IMPORTERS • MANUFACTURERS

"CARBON-RAISER"
(Trade Mark Reg.)

Used in Iron Foundries to increase carbon and improve machinability of castings. In Steel Foundries to increase combined carbon content.

COLLOIDAL GRAPHITE in various vehicles	**CORE PASTES** Strong bond, dry quickly.
HYDRO GRAPHITE (It's New!) Excellent permanent mold wash.	**SOAPSTONE—Talc**
FACINGS	**"MOLDUKO"** (Trade Mark Reg.) **CORE & MOLD PROCESS** Produces smooth castings. Stops "burning in". Air-dries.
CORE WASHES (All Types)	**PIPE REDUCER** Used on gates and risers in steel and iron foundries.
INGOT MOLD WASHES	**LADLE WASH**
PARTING (Dry or Liquid) Non Silica or Tripoli, highest quality.	**MUDDING COMPOUNDS**

SUPERFLAKE GRAPHITE PRODUCTS

SUPERIOR GRAPHITE COMPANY
TELEPHONE: RANDOLPH 6-7939
33 South Clark Street Chicago 3, Illinois

Circle 733 on Inquiry Card—Page 51

AFS Starts Training Courses At Three Centers This Fall

A series of one-week intensive training courses for foundry employees will be initiated this fall by the newly formed Training and Research Institute of the American Foundrymen's Society. Present plans are to conduct courses in three Midwest localities: Rackham Memorial Building, Detroit; Marquette University, Milwaukee; and one of the major Chicago technical colleges.

Plans call for one or two sessions at Marquette on industrial engineering and time study methods. A series of seven sand courses are planned at the Detroit technical center. The Chicago courses will cover ferrous melting practice and demand for attendance will govern the number to be offered.

All courses will be of one-week duration, Monday to Friday, and admission fees sufficient to cover expense of the meetings will be charged. The courses are under direct preparation and supervision of the AFS Institute. H. Bornstein, former director of laboratories of Deere & Co., Moline, Ill., is chairman.

Individuals and companies are urged to register early for the various courses which are scheduled to begin in August. Attendance will be limited at most of the courses to 25. At least one of the sand courses, it is planned, will permit attendance up to 200.

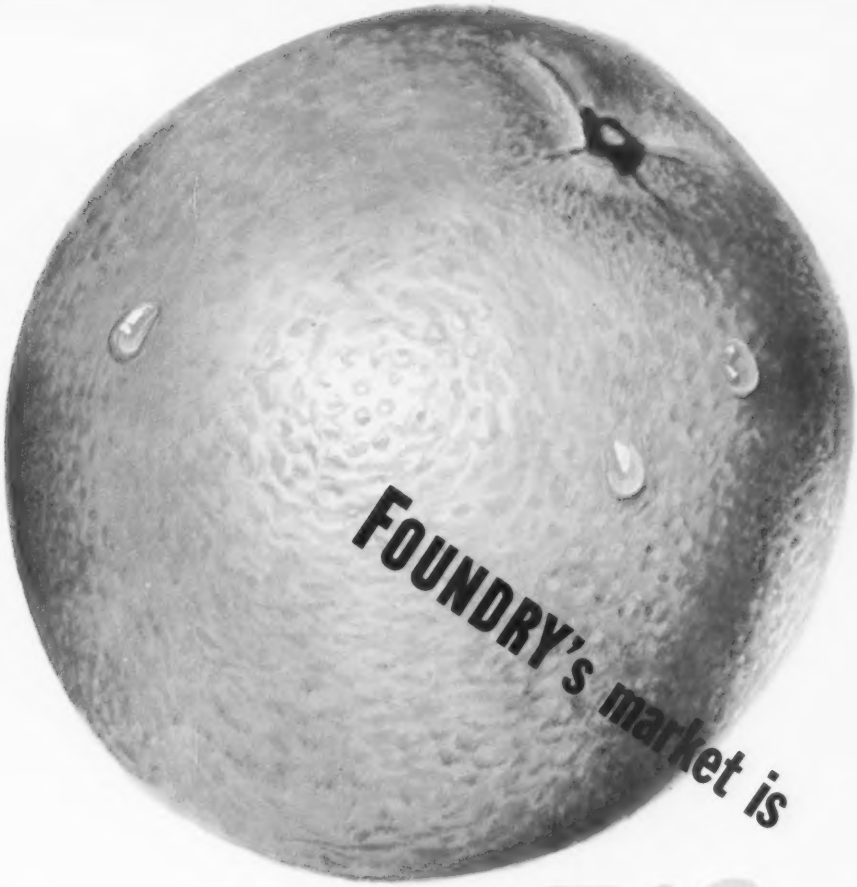
Registrations and inquiries should be addressed to S. C. Massari, director of the Training and Research Institute, AFS Headquarters, Des Plaines, Ill.

Prime-Mover Co. President Writes Book on Foreign Policy

C. M. Stanley, president, Prime-Mover Co., Muscatine, Iowa, is the author of "Waging Peace"—a book on international relations, published by the McMillan Co., and released for general distribution.

Subtitled "A Business Man Looks at Foreign Policy," the material is written in a style to bring it within the focus of the average informed reader. The logical and direct analysis of the factors involved in an approach to international understanding and world peace are lucidly presented and stimulating.

Mr. Stanley has served the past two years as national president of United World Federalists and this year heads the organization's executive council. His company produces motorized material handling equipment.

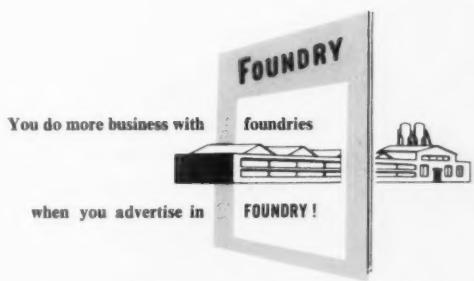


* **Foundries are shooting for a new goal** of 21 million tons annual output by 1960. They must equip now.

* **FOUNDRY readers spend over $120 million a year** to fight obsolescence, improve efficiency and over $1 million *an hour for materials* to meet today's demand for higher quality castings.

* **Huge replacement market** is accelerated by the fast rate of wear-out in foundry equipment.

* **Market selling help** is available to you through FOUNDRY's complete Sales Development Service. Write for more information on this result-getting program.



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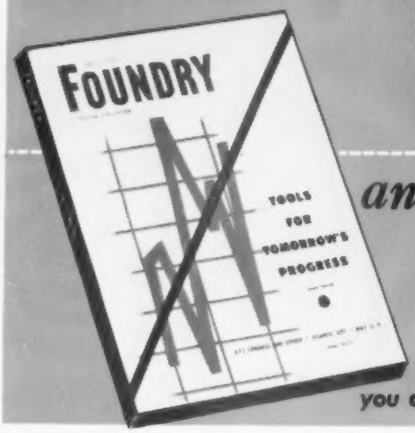
the $6 BILLION foundry market is worth selling!



and nothing covers it like FOUNDRY

- Read by over 75,000 key buying influences
- Reaching 6,000 foundries accounting for 97% of the industry's melting capacity

***you do more business with foundries when you advertise in* FOUNDRY**

MARKET

Foundries spend over *$1¼ million an hour* for the materials and supplies necessary to produce an annual average of 18 million tons of castings. This adds up to over *$2½ billion* annually—does not include the estimated $35 million for plant expansion and $85 million for new equipment which the industry's 6,200 plants will invest in the next 12 months.

A GROWING MARKET

The foundry market is a part of no other market. As a basic industry it is directly related to population growth. Already 100% ahead of 1939 in physical output, the industry expects another 20% increase by 1960.

Foundries rank well above many allied industries commonly thought of as huge.

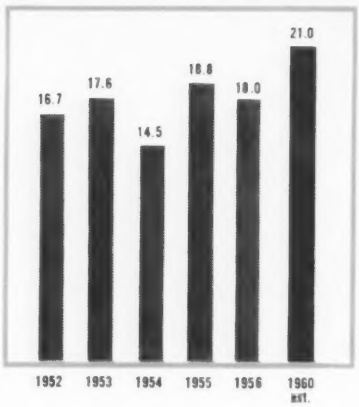
(Based on 1954 Census Of Manufacturers)
Value Of Products Shipped

Rubber Products	$ 3,724,000,000
FOUNDRIES	3,053,000,000*
Tractors and Farm Machinery	2,245,000,000
Commercial Printing	2,215,000,000
Machine Tools	1,169,000,000
Machine Shops	1,073,000,000
Iron and Steel Forgings	622,000,000

**Value of current foundry production including castings produced by captive foundries for "own use" is approximately $6,000,000,000.*

BIG REPLACEMENT MARKET

Foundry equipment wears out fast—is replaced fast—in this gigantic replacement market. Replacement plus the continuing trend to mechanization means *more* dollars to be divided among the manufacturers who are actively selling to the foundry industry.



Over 90% of all durable goods manufactured require castings—as end products or as component parts. That's why the foundry industry is gearing up to produce 21 million tons of castings by 1960—a new all-time record.

COVERAGE

Nothing covers the foundry market like FOUNDRY! It's the publication foundrymen *depend* on for latest product, equipment and method information. It's read intensely . . . brings action fast . . . among the key buying influences in all foundries in the U.S. and Canada representing 97% of the industry's melting capacity.

You reach this wealth of buying power *best* between the covers of the industry's Number 1 publication—FOUNDRY magazine.

FOUNDRY enters more PLANTS

	PLANTS	PERCENT
2500 or more employees	6	100
1000 to 2499	42	100
500 to 999	79	100
250 to 499	260	100
100 to 249	594	100
50 to 99	770	100
20 to 49	1,305	100
Less than 20	3,152	90

FOUNDRY's coverage by METALS CAST

	PLANTS	PERCENT
Gray Iron	2,729	95
Malleable	130	100
Steel	452	99
Brass and Bronze	2,723	87
Aluminum	3,355	83
Magnesium	261	85

FOUNDRY reaches more than 75,000 BUYING INFLUENCES

Through FOUNDRY your product story reaches over 75,000 key buying influences at executive, engineering, production, and purchasing levels in every worthwhile foundry in the industry—the foundries accounting for 97% of the industry's melting capacity.

Analysis of FOUNDRY readership:

Management Personnel	14,761
Production Personnel	38,508
Process Control Personnel	9,627
Other Foundry Personnel	1,284
Government Personnel	1,085
Educational Personnel	2,920
Supplier Personnel	5,203
Castings Users and Others	1,870

FOUNDRY is the gateway to BIG business in the foundry industry. Let FOUNDRY help you capture your share of this rich, growing market. Get full details on FOUNDRY's complete Sales Development Service now.

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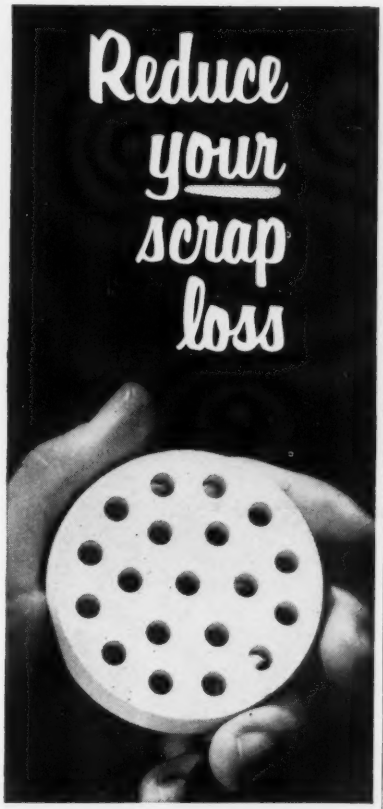

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CERAMIC
STRAINER
CORES

It's a fact, that Porcelain Products *ceramic* strainer cores will reduce casting rejects — provide higher quality, slag-free castings for your customers—and save *you* money besides. Porcelain Products ceramic cores will not spall, erode or disintegrate during pouring, resulting in a foundry product free of sand inclusions. Porcelain Products cores permit controlled pouring—reduce machining time. They will withstand high heat, thermal shock—can be stored indefinitely.

Try them . . . and compare the advantages of Porcelain Products ceramic strainer cores with the sand cores made in your own plant. Write today for samples, and complete informational folder.

63 years
PP INC.
Porcelain Products, Inc.
FINDLAY, OHIO

Circle 734 on Inquiry Card—Page 51

Nondestructive Testing Group To Meet in Chicago

The Second International Conference on Nondestructive Testing in conjunction with the 17th annual convention of the Society for Nondestructive Testing will be held in Chicago, Nov. 3-8, at Hotel Morrison. At the same time, the Second World Metallurgical Congress, the 39th annual National Metals Congress and National Metal Exposition will be held.

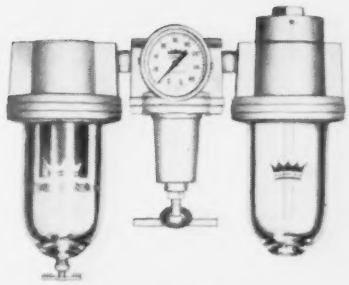
Conferees from outside the United States are being offered optional guided tours, arranged by the Amerian Society for Metals. The tours, covering nine subjects of technical interest, will occupy two weeks. Important plants, institutions and operations will be visited and local conferences will be held. Tours will end in Chicago on Nov. 3 prior to the opening of the international conference.

Additional information concerning the tour or the convention may be obtained from William E. Havercroft, Dept. of Mines & Technical Surveys, 568 Booth St., Ottawa, Ont., Canada.

Ford Plant Wins Safety Award

Employees of the Cleveland Foundry, Ford Motor Co. have earned the "Group Safety Award," in a Cleveland-wide Industrial Safety Campaign conducted between April and September, 1956. During the campaign the foundry chalked up the best safety record in the foundry group. During 1956 the foundry received the National Safety Council's Award of Merit for its record of working over 2 million man-hours without a lost-time accident for the period between March and August.

"Never mind how I got in this core—just get me out."



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BULLETINS
TELL HOW...

Hannifin's newest development, the Crown Line of FILTERS, REGULATORS and LUBRICATORS, saves money wherever air power is used. The filters remove dirt and scale without robbing you of precious power. The regulators let more air through when it's needed than other regulators do. The lubricators operate on minimum pressure differential —they are quicker and easier to fill, too. Available now—local, distributor stocks in many areas. Write for bulletins and for name of nearest distributor.

"COMBO" UNITS
Bulletin 300

REGULATORS
Bulletin 301

FILTERS
Bulletin 302

LUBRICATORS
Bulletin 303

COMPLETE RANGE OF SIZES
HANNIFIN
FILTERS • REGULATORS • LUBRICATORS

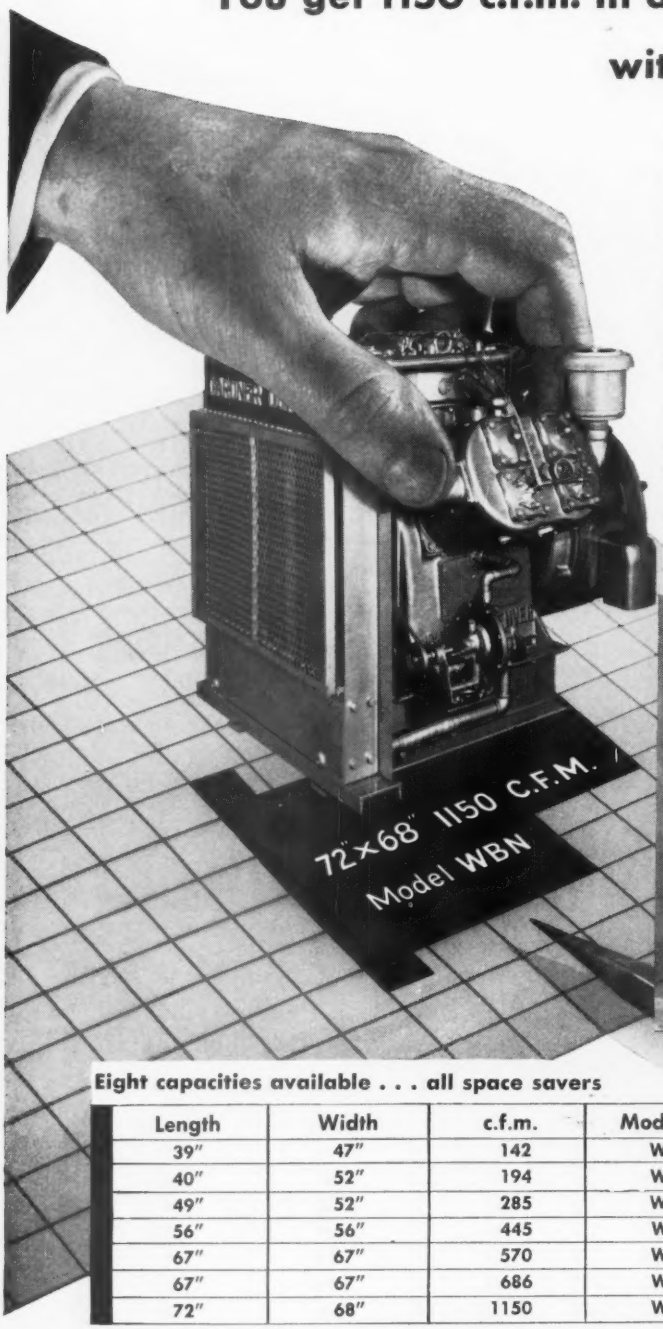
Hannifin Corporation
637 S. Wolf Rd., Des Plaines, Ill.
Send me your Crown Bulletins and name of nearest distributor.
Name.....
Position.....
Firm.....
Address.....
City.....*State*.....

Circle 735 on Inquiry Card—Page 51

Your own plotting will prove it!

You get 1150 c.f.m. in a 72"x 68" space

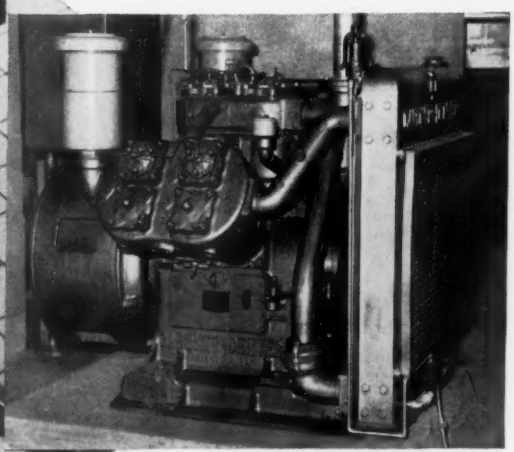
with this *new* compressor!



With the cost of factory floor space nudging the clouds, this new, compact Gardner-Denver packaged compressor is just what many plant planners want.

Occupying only 34 sq. ft. of space, this 200 h.p. unit rated 1150 c.f.m. In many instances, this volume is sufficient to permit retirement of two smaller units, with corresponding savings in space.

The new Model WBN needs no special base. You just bolt it down, hook up, and go. It is available with a self-contained radiator-intercooler that saves on cooling water, or with a tube-type intercooler. Write for complete details.



Eight capacities available . . . all space savers

Length	Width	c.f.m.	Model No.
39"	47"	142	WBR
40"	52"	194	WBE
49"	52"	285	WBQ
56"	56"	445	WBH
67"	67"	570	WBK
67"	67"	686	WBJ
72"	68"	1150	WBN

ENGINEERING FORESIGHT — PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

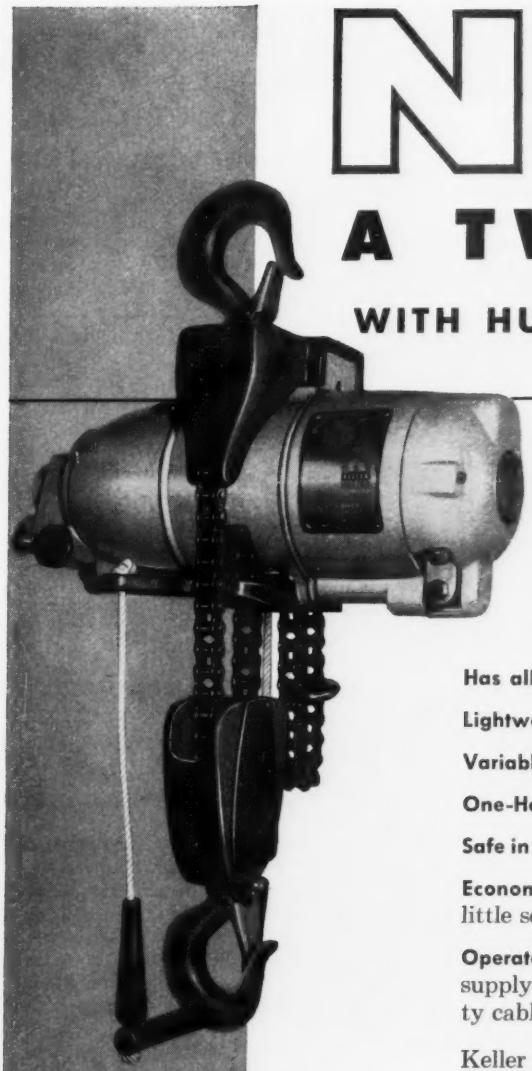
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

Circle 736 on Inquiry Card—Page 51

NOW!

A TWO-TON LIFT

WITH HUSKY 100-POUND AIR HOIST



New Keller Tool air hoist weighs 100 pounds . . . raises a 4000-pound load at 10 feet per minute. Hoist is strong and powerful enough to handle the 2-ton load with complete safety.

New 2-ton hoist is powered by high-torque, axial-piston compressed air motor for positive starts and stops. A centrifugally governed, fully mechanical brake prevents slippage. Length of lift is 8 feet. Hook-to-hook dimension is only 23½ inches.

Has all the outstanding features of the Keller Tool air hoist line:

Lightweight—easy to move and hang.

Variable Speed—from creep to maximum.

One-Hand Control—of lifting, lowering, spotting.

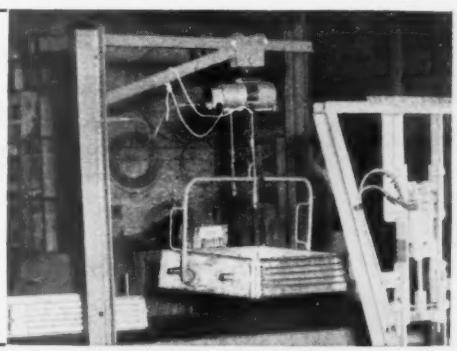
Safe in Heat or Dust—air motor doesn't spark . . . won't heat up.

Economical Operation—air consumption is low . . . requires little servicing or maintenance.

Operator Safety—powerful brake holds load regardless of air supply. An exclusive feature of the new two-ton hoist is a safety cable hole that provides extra safety for load and operator.

Keller Tool air hoists are available in lifting capacities of 150 . . . 300 . . . 500 . . . 1000 . . . 2000 . . . and *now* . . . 4000 pounds. Write for Bulletin 86.

Keller Tool air hoist lifts, turns and positions mold . . . is used with cope and drag molding machine.



ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

Chicago Gray Iron Founders Hold Quarterly Meeting

R. G. McHugh, Phillips Associates, sales consultants, Chicago, addressed the quarterly luncheon meeting of the Chicago Area Management Group of the Gray Iron Founders' Society, Feb. 19. In his talk, "Profitable Planned Selling," Mr. McHugh outlined the steps which a salesman can follow in developing sales. He pointed out that salesmen usually do a good job as far as their product is concerned, but frequently have difficulty in translating the product into industrial processes.

Prior to the luncheon the group toured the plant of T. L. Arzt Foundry Co., a jobbing foundry producing gray iron castings. About 10 tons of iron are poured daily, and employees number around 55.

Donald H. Workman, executive vice president, reported on future society activities, including the regional Marketing and Sales Clinic scheduled for May 28 and the annual meeting on Oct. 9-11, both at the Drake Hotel, Chicago. He also reviewed efforts of GIFS in enforcing government restrictions on ferrous scrap exports.

Film Describes Insulations For Piping and Equipment

The Magnesia Insulation Manufacturers Association has made a color-sound slidefilm, "Molded Masters of the Btu," describing a family of four thermal insulations for piping and equipment which reach 200 to 1900° F. Insulating theory, ingredients, production, application and properties of insulating materials are depicted.

Supervised showing can be arranged for by contacting the Magnesia Insulation Manufacturers Association, 1317 F St., N.W., Washington 4. Insulation authorities are available to lead discussions following the film showings.

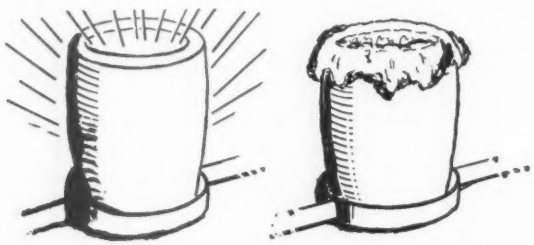
Book Review

Tool Design, by Cyril Donaldson and George H. Le Cain, cloth, 557 pages, 6 x 9 in., published by McGraw-Hill Book Co., New York. Price $6.75.

This textbook was written at the Rochester Institute of Technology as part of its program for developing practical teaching materials closely related to industry requirements. General methods of tool design which enable the student to develop ideas into practical specifications for modern manufacturing methods form the basis of the work.

The section on sand castings contains the statement that they are apt to be brittle and have rather low tensile strength. The fact is that strength of castings depends more on the type of metal poured than on whether the parts were cast in sand or in another mold material. Furthermore, within a family of metals the various alloys and production treatments to which they are subjected affect strengths. Ductility is extremely high as is tensile strength in many alloys.

The statement also is made that castings are not quite uniform and may have blowholes, pinholes and other small blemishes; consequently, if insufficient metal is provided, some castings may not clean up when machined to their final dimensions. Such a statement creates the erroneous impression that castings characteristically lack uniformity and contain defects. Well designed castings, like metal parts made by other methods of manufacture, in most instances are sound, usable and dependable.

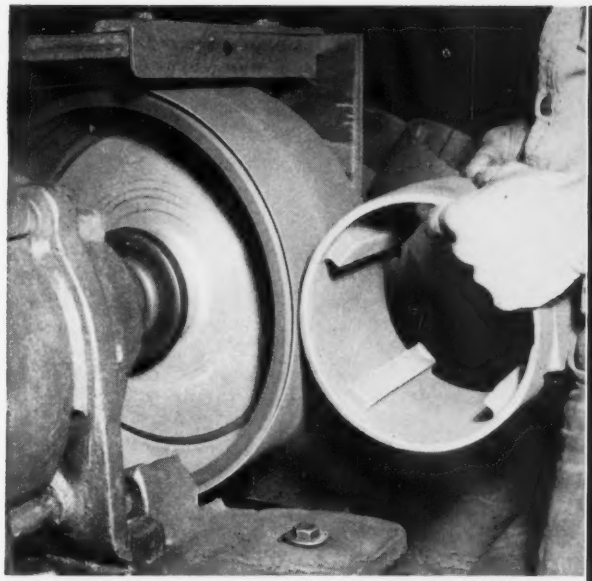


Not Too Hot . . . Not Too Cold

Pouring at just the right temperature is the big thing! Casting the metal at exactly the right heat is the thing that assures sound, uniform casting results. As you know, foundry operations are now too costly to be wasted on gassed castings, cold-shuts or misruns!

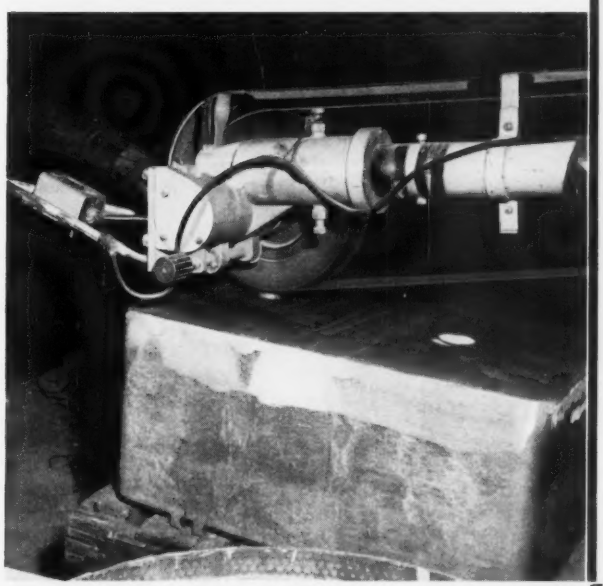
This is where Marshall Enclosed-Tip Thermocouples will help you, as they are helping other foundries everywhere. Marshall Thermocouples will measure the temperature of your molten brass, aluminum and magnesium quickly and dependably. They are always easy to use and always ready.

Marshall Enclosed-Tip Thermocouples are made in two types for use in furnace or ladle. Send for free descriptive literature. L. H. Marshall Co., 270 W. Lane Ave., Columbus, Ohio.



California foundry uses a 3M Coated Abrasive belt to remove parting lines on steel electric motor frames. Belts replaced hard wheels, provide a vastly superior finish.

Connecticut foundry finds 3M Coated Abrasive discs ideal for removing flash from cast aluminum potato peelers. Disc gives an excellent finish—blends area *fast*.



Eastern non-ferrous foundry uses 3M Coated Abrasive belts to cut rises from aluminum traffic signal control boxes. Belts helped increase production 50% over the old method.

Cut foundry costs . . . boost production with 3M Coated Abrasives

Here's the *modern* method for putting a quality finish on your castings. 3M Coated Abrasives—belts or discs—are engineered to give you better, faster finishing at lower unit costs. Regardless of your method of casting—sand, shell, die or CO_2—these modern grinding and finishing tools will do an outstanding job for you, help you increase production, cut costs.

Find out how 3M Coated Abrasives can go to work in *your* foundry. Call your 3M Representative *today* or send coupon below.

Send today for FREE Booklets

Minnesota Mining and Manufacturing Co.
Dept. CN-57, St. Paul 6, Minn.

- ☐ Send me free booklet: "The 3M Method of Belt Grinding and Finishing"
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Company_____

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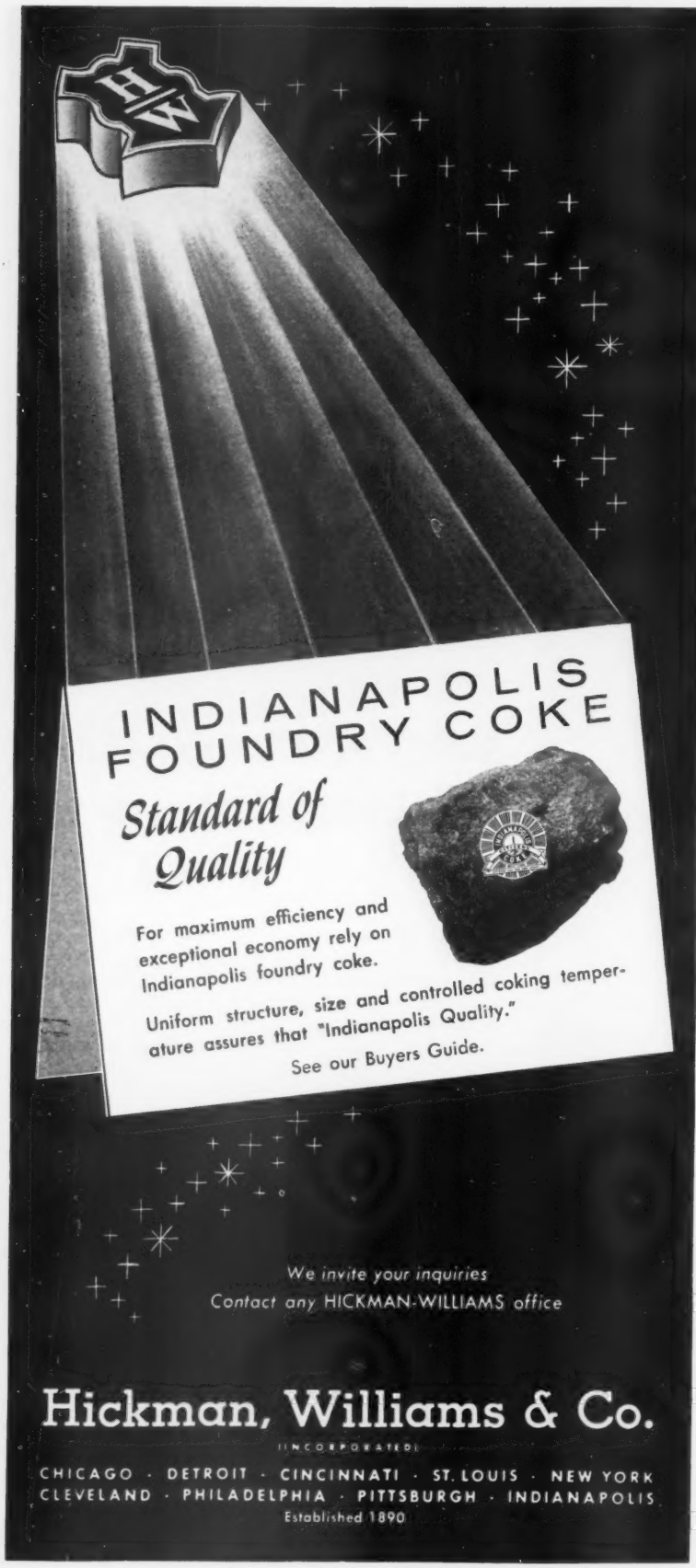
3M ABRASIVES

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Ave., N.Y. City.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FOUNDRY COKE
Standard of Quality
For maximum efficiency and exceptional economy rely on Indianapolis foundry coke.
Uniform structure, size and controlled coking temperature assures that "Indianapolis Quality."
See our Buyers Guide.
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Contact any HICKMAN-WILLIAMS office
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How Much Electricity Causes Electrocution?

Extremely Low Voltages Have Caused Fatalities

By Dr. W. Schweishheimer

HOW much electricity is necessary to electrocute a person, and how long must it be applied? This problem is of immense practical importance for every branch of industry, for electricity today is as vital to industry as water to the human body.

According to the *Journal* of the American Medical Association, the intensity of current was less than 110 milliamperes in two recent cases of fatal shock. Some authorities say that currents as low as 25 ma have been fatal. In other instances, however, currents of many amperes have failed to cause death, although they produced severe local burns in the extremities.

The Heart Is Vulnerable—Why the inconsistency in this matter of current? The reason is simple: It results from the different paths taken by the current in the body. Actually, the heart is the most vulnerable organ, and within each movement of the heart there is a period during which the heart is less susceptible to shock than it is at other times. For this reason, the exact instant of the shock often is all-important in deciding the outcome. The duration of flow can be less than 1 millisecond, the *Journal* points out. Since the body as a whole is a conductor, it becomes part of a condenser when separated by a di-electric from any other conductor. The thinner the di-electric and the greater the opposed areas of the two conductors, the greater the capacity of the condenser so formed. Under favorable conditions, the capacity of this condenser would reach 1 millimicrofarad.

Charged at 1000 volts, it could deliver 0.000001 coulombs, which would maintain a current of 1 ma for 0.001 second. Under certain special conditions this quantity could be still further increased and might even give a perceptible shock to another person.

Low-Voltage Hazard — Although the danger of high voltage is generally known, it is necessary to be careful of low voltage as well. Low voltages are dangerous because they interfere with the mechanism of the heart muscle. They produce what is called ventricular fibrillation (disturbances of the muscular activity of the heart ventricle).

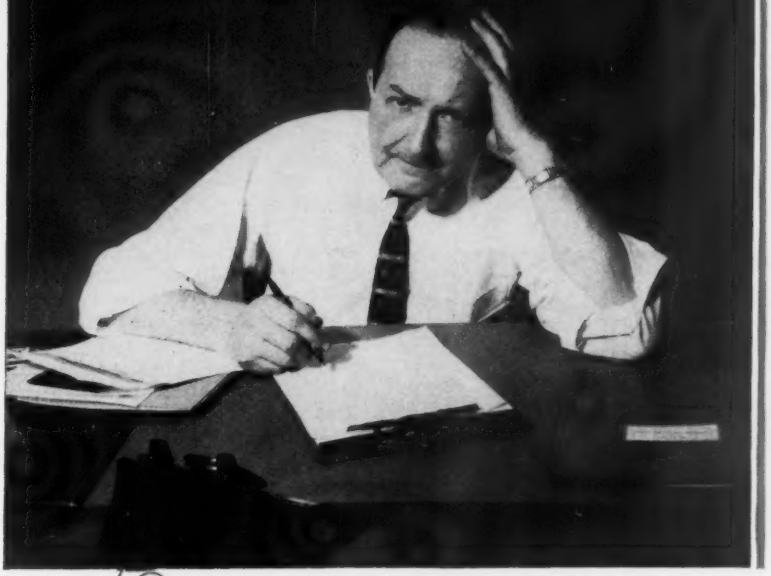
High voltages, on the other hand,

Circle 747 on Inquiry Card—Page 51

Circle 748 on Inquiry Card→

For Real Help

in making cold setting binder work



Call G. E. SMITH, INC. for "in-plant" engineering assistance.

EXCLUSIVE MANUFACTURERS OF THE ORIGINAL ®

KOLD-SET

COLD SETTING BINDER

Many foundries are reaping cost savings of as much as 65% with the Kold-Set cold setting binder process. Two facts account for this...

Kold-Set is a *proved* cold setting binder. Moreover, in introducing this totally new concept of core and mold making, G. E. Smith foundry specialists learned very early that the cold setting binder process cannot simply be used. It must be engineered . . . adapted to each foundry's individual method of operation. This requires specialized training and experience.

G. E. Smith engineers have the training and experience necessary to come into your plant and make the Kold-Set process work . . . to adapt it to your operation for best results . . . consistently.

So, if you want real help, call G. E. Smith now! Once installed, the Kold-Set process means cost savings in your overall operation.

FOR FULL TECHNICAL DATA...

Write for Technical Bulletins 2 and 3 for the complete story on the Kold-Set process and how it can drastically reduce costs.

KOLD-SET

COLD SETTING BINDER ADVANTAGES

Laboratory Control

Only finest ingredients, in full measure are used to make Kold-Set Binder and Activator. Completely uniform manufacture, governed by scientifically controlled laboratory procedure makes Kold-Set consistent in quality . . . the unrivaled best cold-setting binder.

Engineering "Know-how"

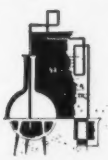
G. E. Smith engineers have the broad background of foundry experience necessary to apply Kold-Set to core and mold making problems intelligently. They are backed up with a thoroughly qualified, service-minded engineering and research organization.

On the job Assistance

G. E. Smith service includes "in-plant" assistance in setting up the best method for making cores and molds with the equipment available. Engineers are qualified and equipped to recommend methods to achieve optimum results with Kold-Set at a minimum of expense.

Proved Performance

The Kold-Set process not only greatly speeds core and mold making. It has been proved in plant after plant to produce uniform, more accurate cores and molds with excellent surface and dimensional stability. It produces better castings at lower overall cost.



G. E. SMITH, INC.

246 WASHINGTON ROAD PITTSBURGH 16, PA.

ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES.

produce irreparable damage through destruction or inhibition of nervous centers. The heart stops beating, and the lungs stop breathing (asphyxia).

Most industrial electrical hazards are in the lower voltage range (120 to 440 volts). A number of cases are on record where contact with 60- and 65-volt circuits of commercial frequencies have resulted in fatal accidents. The lowest voltage fatality discovered by one investigator occurred at 46 volts, 60 cycles. It seems probable that circuits of 24 volts or less may be considered safe under practically all conditions.

Low-voltage current is hazardous particularly when the body contacting it is wet, even from perspiration. The body also must be in close contact with both the ground and the live conductor. Dry skin itself is a bad conductor because of its high resistance (up to 100,000 ohms per square centimeter). Yet under thoroughly wet conditions the resistance of the skin may fall to as low as one-hundredth of its dry value.

Defective Equipment — Although they are feared less, there are many occasions when low-voltage hazards can take a toll. Defective portable lights, defective electric cords which render metal objects "live," electrical equipment or circuits repaired while "live," open switchboards and fuse-boxes in older installations, improper fusing, generally defective equipment, defective portable electric tools and machines, ungrounded cases on boxed machines, rheostats, resistance units and hot controllers—each may prove lethal.

High-Voltage Hazard—With high voltages (often used for transmission and distribution), most contacts result in serious injury. In the range from 1000 to 7500 volts, almost every contact which causes current to flow across the body will cause a non-breathing shock condition. About half of these cases can be revived if artificial respiration is started promptly. Circuits of more than 7500 volts need not be contacted to produce severe injury since current is able to jump a gap in this volt range.

Recently, high-voltage accidents have been described where men came in contact with conductors carrying 45,000 to 50,000 volts. In most cases artificial respiration had to be carried out for a long time, and some of the men actually recovered! The change within the muscles due to the high-voltage current did, however, produce lasting damage to the kidneys, which had to excrete the destroyed muscle.

The two immediate problems of treatment of electric shock are suspended respiration and fibrillation of the heart muscle. Both are urgent. If the heart is not fibrillating (that is, if the regularity of the action of the heart muscle is out of order), artificial respiration must be started at once.

On the other hand, if the heart muscle is fibrillating, the doctor has a choice of various treatments (none of which is absolutely reliable). Generally, it is safe to say that if the patient survives, the electric shock ordinarily is either of a temporary nature or it is fatal. Only rarely does an electric shock cause permanent damage.

Shock and Consciousness—The degree of shock produced by an electric current is influenced by length of contact, strength of current, parts of the body through which the current passes and some other factors. Many electric shock victims may be revived by artificial respiration (like the apparently drowned). A Canadian report describes a patient who recovered after continuous application of artificial respiration for eight hours.

A fatal electric shock does not al-

SPECTROGRAPHIC EQUIPMENT
for Metal Analysis by
Baird — Atomic

The Direct Reading Spectrometer

Quality-control analytical laboratory for production and research. Simple, rapid operation — forty seconds for complete analysis on dials reading directly in percent concentration. Permanent optical alignment with the Automatic Servo Monitor. Other features include: unique (patented) measuring system . . . plug-in components assuring continuous operation . . . rugged design for plant operation . . . and versatile specimen holders.

Baird-Atomic offers a complete line of spectrographic equipment for the analysis of metals in production and fabrication.

B-A instruments provide rapid, accurate analysis . . . simple, stable operation, trouble-free economical performance.

Spectromet Designed for production-floor operation by non-technical personnel. Sealed housing provides complete environmental protection of optical and electronic systems. Spectromet provides rapid direct-reading results, extremely simple operation. No critical adjustments. Automatic Servo Monitor for permanent optical alignment. Analysis of eight elements in 40 seconds.

Complete Spectrographic Laboratory

Baird - Atomic, a pioneer in the emission spectrographic instrument industry, offers a complete line of equipment for a spectrographic laboratory. Over twenty years of experience and design are incorporated into the following components: Three-Meter Grating Spectrograph, with its 20-inch camera; Double Beam Densitometer Comparator, employing an optical null-balance system and allowing for direct density measurements on a linear scale; Calculating Board, to easily translate densitometer readings into percent concentration values; and Spectrographic Source Unit, whose versatility supplies a full choice of excitation conditions for all emission problems.

Complete Technical Information Available Upon Request.

BAIRD ATOMIC

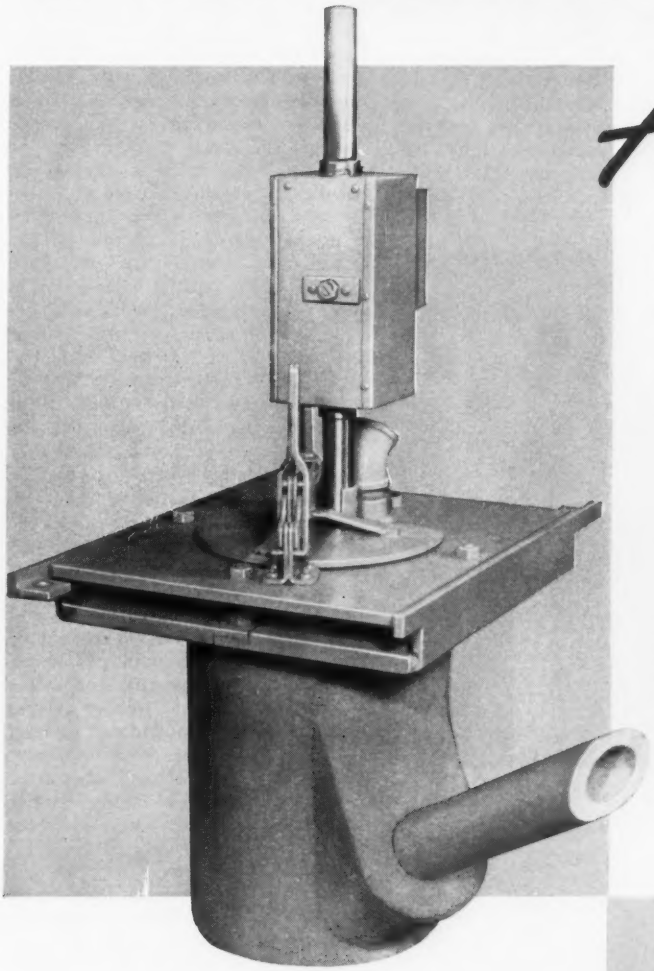
Baird — Atomic, Inc.
33 UNIVERSITY ROAD, CAMBRIDGE 38, MASSACHUSETTS

Automatic casting of Aluminum *now practical*

with *New* LINDBERG-FISHER

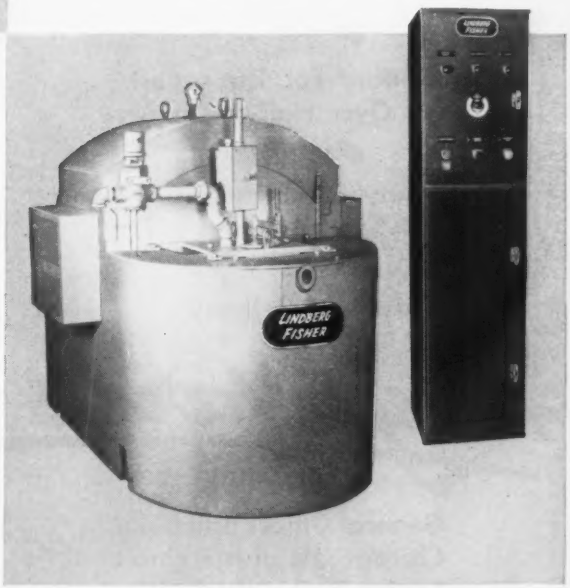
We call it "LITTLE JOE"

Autoladle



To the best of our knowledge the Autoladle is the first practical automatic aluminum ladling unit yet divised. Thoroughly tested and proven in service, the Autoladle is adaptable to induction, electric resistance or fuel fired reverberatory furnaces. In any installation it offers these advantages:

- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.



At the right, "Little Joe" is shown installed in a Lindberg-Fisher electric resistance aluminum holding furnace. With it is the panel cubicle and controls which is supplied completely assembled and wired. For complete information on the Autoladle get in touch with your nearest Lindberg Field Representative (See your classified phone book) or write us direct.

LINDBERG FISHER

A Division of Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

Circle 743 on Inquiry Card—Page 51

ways produce death or even unconsciousness immediately. The shock may cause a rise in temperature. A man who is still able to talk after the shock then vomits and passes into unconsciousness, the victim of a type of heat stroke. When electric shock acts directly on the heart, it may produce muscle fibrillation or complete arrest.

Extended Artificial Respiration—In cases of apparent death after electric shock, the heart activity may be so low and slow that it cannot be heard or discovered. It is advisable to continue artificial respiration after electric shock for two hours after all signs of life have ceased.

Our present theoretical knowledge of the peculiarities of electric shock and injuries calls for an entirely conservative method of treatment. Two measures may prove necessary: lumber puncture (tapping of the spine for relief of pressure or for diagnostic reasons) and staunching of sudden, unexpected bleeding.

Again, the nervous system may be so profoundly shocked or fatigued by contact with electric current that it cannot function normally for a period of minutes or hours. The victim, although conscious, is temporarily paralyzed. If nature is given the opportunity, she often will repair the temporary damage and again permit the signals from the brain to reach the organ or limb which was temporarily paralyzed by the electric shock.

Indirect Damage—It often happens that people working with electric current suffer accidents only incidentally connected with electric shock. The shock itself may not be fatal, nor may it cause any serious damage to organs or tissues. What it may cause is sudden and uncontrollable contraction of the muscles so that the victim falls or bumps against other objects, with resultant mechanical injuries. Workers sometimes suffer severe or fatal injuries through falls as the result of receiving electric shock while working on high switchboards and poles. However, barring mechanical injuries, most victims of electric shock (if they survive at all) recover completely, without damage to the nervous system.

Safety Program—Cover all ground with rubber blankets or mats. Cover every live line within reach with a line hose. If working on live lines of less than 4000 volts, wear rubber gloves and sleeves with protectors. Never permit a live-line connection to dangle loosely. Rubber gloves should be tested and rotated at least monthly. For live work at about 4000 volts, hot-line tools should be used. Nobody should depend on two pairs of rubber gloves, worn one over the other; they are not sufficient for high-voltage current.

It is an old experience that nearly half of all the deaths from accidental electric shock occur during the summer. Greater outdoor industrial activity and frequent perspiration in the warm months are two of the causes, but they do not provide a complete explanation. As in all problems connected with electric shock, there is still a measure of mystery connected with the increased hazard of electric shock in summertime.

See you at the show!
Space 525
Cincinnati Music Hall

BRASS AND BRONZE

INGOT

Standard For The Industry
For Over Half-A-Century

Any Specifications
Special Alloys

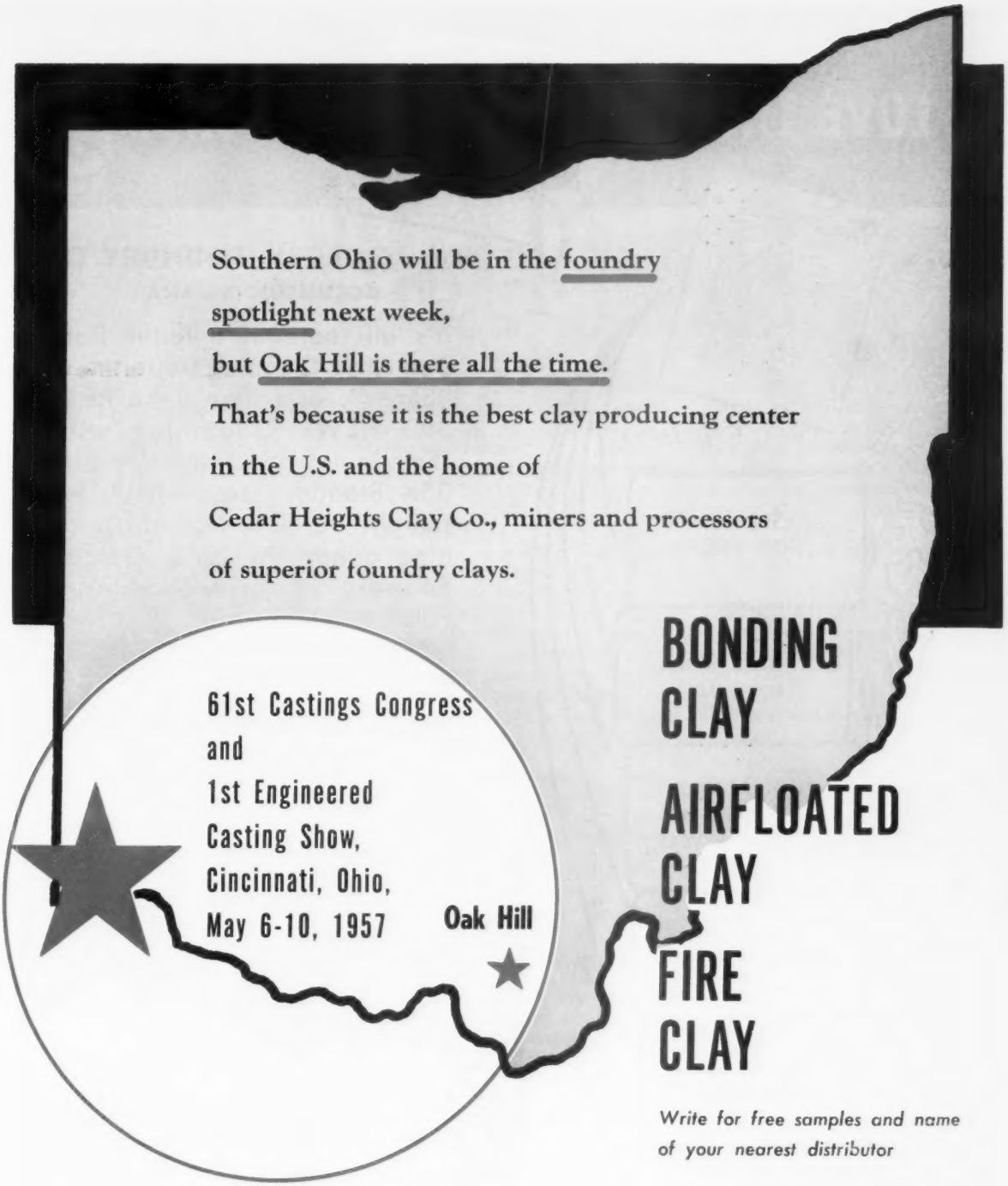
Prompt Delivery

Benj. Harris & Co.

General Offices and Plant
Chicago Heights, Illinois
Offices in Principal Cities

Canadian GIFS Group Elects

G. B. Winkworth, Toronto Foundry Co. Ltd., Toronto, Ont., is the new chairman of the Ontario Management and Cost Group of the Gray Iron Founders' Society. Other officers recently elected include J. P. Lubenkov, Link-Belt Ltd., Toronto, vice chairman; W. J. L. Hutchison, John T. Hepburn Ltd., Toronto, secretary; and A. Reyburn, John Bertram & Sons Co., Dundas, treasurer.



SINCE 1924

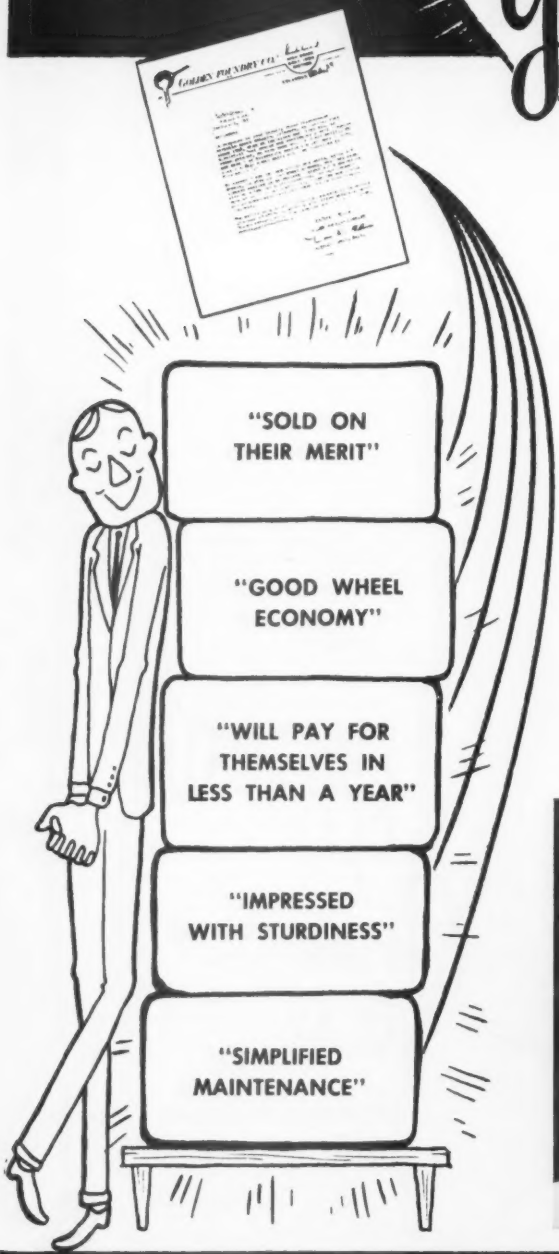
CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

LOVE THOSE Golden WORDS...

from GOLDEN FOUNDRY CO.
COLUMBUS, INDIANA

It's all there in a letter from Don Alvis, Cleaning Department "Super", and here's the REAL BIG NEWS: Beginning with their initial order for a model 35A Standard twin-wheel, infinitely variable speed snagging grinder in 1948, Golden Foundry has since ordered FOUR MORE.


"SOLD ON THEIR MERIT"
"GOOD WHEEL ECONOMY"
"WILL PAY FOR THEMSELVES IN LESS THAN A YEAR"
"IMPRESSED WITH STURDINESS"
"SIMPLIFIED MAINTENANCE"

5 MACHINES IN 8 YEARS!

Note: Visit our suite at the
AFS CASTINGS CONGRESS
Hotel Gibson • Cincinnati
May 6 thru 10*

2-33VL Standard grinders at Golden Foundry — installed August, 1956

*In Cincinnati, Be Our Guest! OPEN HOUSE Our Plant See Standard equip. in operation

SINCE 1912

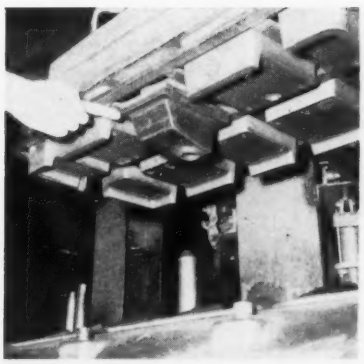
the STANDARD electrical tool co.

SNAGGING GRINDERS AND MACHINE TOOLS

2507 RIVER ROAD • CINCINNATI 4, • OHIO

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 326



POURING BASIN FORMER

Rubber pouring basin former is said to be designed to practically eliminate the swirl of molten metal, causing slag to float rather than enter the mold cavity. In use, the down sprue pin is wiped clean as the jolt table rises. This wiping action eliminates cutting and blowing out the sprue, keeping the pouring basin free from loose sand. Several standard sizes and designs are available. Formers also can be made to customer specifications. Made by **Keson Industries,** Box 11, Berwyn, Ill.

For More Details Circle No. 401—Page 326

CONTROL VALVES

Quick-dump control valves for operating double-action cylinders are four-way, five-port models with no internal springs, packings, pistons or sliding metal-to-metal contacts. Two of the valves are electrically operated and the third is equipped with a hand lever. The electric valves use electromagnetic armatures in place of solenoids. One electric valve is of the momentary impulse type, the other is the fail-safe type. The hand-lever model is designed for mounting on bench, machine or at production line station, and lever action requires a fingertip touch, with a short forward or backward movement to provide rapid valve action. Made by **Humphrey Products Division, General Gas Light Co.,** 202 North Park St., Kalamazoo, Mich.

For More Details Circle No. 402—Page 326

PLASTIC METAL

Putty-like composition metal and resinous compound can be used in making repairs to castings, machinery, pipe lines, valves, boilers, tanks, radiators and holes, dents or tears in metal. It can be combined with glass cloth or wire screen for reinforcement. It cures hard in ten minutes. The material may be ground, drilled, sanded or painted and applied without special tools, skill or technical knowledge. It has toughness, resistance to chemicals, oil, gasoline and water and can withstand temperatures to 225°F. Made by **Plant Maintenance Inc.,** 623 Green Rd., Cleveland 21, O.

For More Details Circle No. 403—Page 326

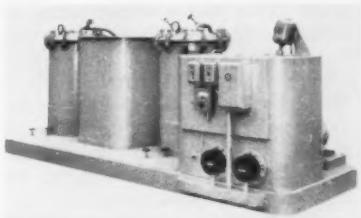
MELTING FURNACES

Revecon melting furnaces (copper, brass, bronze, aluminum), Reverbale self-contained melting and holding units, and YM line of yellow metal furnaces for the permanent mold caster are available in this country. The furnaces are manufactured in Great Britain by Sklenar Furnaces Ltd., Cardiff, Wales. The Revecon furnaces are made in varying sizes to melt from 50 lb to 5 tons. The Reverbale furnaces can handle output up to 900 lb per hr. The YM units are made in two models with capacities of 100 and 800 lb per hr, respectively. Imported by and on display at **International Foundry Supply Co.,** Box 1053, Water & Spruce Sts., Reading, Pa.

For More Details Circle No. 404—Page 326

CASTING IMPREGNATOR

Low-pressure casting impregnator has been redesigned to eliminate sharp corners inside the tanks, allowing sealants to agitate without loss of solids into square corners. The unit uses a virtually noiseless water-cooled vacuum pump capable of raising mercury to 29 in. in four minutes. Company engineers report that the design innovations have increased the penetration and retention of Imprex metallic sealant in microporous castings as well as those of coarse porosity. Made by **Imprex Division, Ideal Industries Inc.,** 2023 South 60th St., Milwaukee 19, Wis.



For More Details Circle No. 405—Page 326

NONFERROUS SHAKEOUT

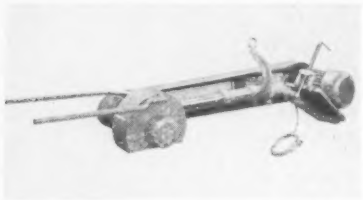
Nonferrous foundry shakeout is engineered to handle brass, bronze or aluminum castings in molds up to 30 in. square and weights up to 500 lb. It can be used also for small gray iron and steel castings. It is 13 in. high and is driven by a ½-hp motor with direct drive coupling. Entire shakeout and load are supported on soft coil springs which absorb all

vibration and impact. No special foundation supports are required. Made by **Hewitt-Robins Inc.**, Stamford, Conn.

For More Details Circle No. 406—Page 326

SWING FRAME BUFFER

Swing frame type buffer has proved successful in buffing large aluminum castings to a high polish where semiautomatic or automatic equipment cannot be used because of



size or irregularity of casting. Buffer is available in various models ranging from 5 to 15 hp and to accommodate buffing wheels up to 24 in. in diam and 6 in. face. Made by **United States Electrical Tool Co.**, 3646 Lewellyn St., Cincinnati 23, O.

For More Details Circle No. 407—Page 326

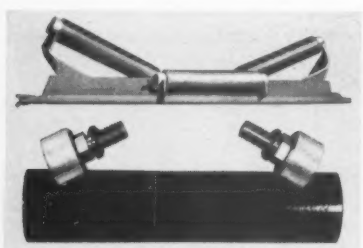
MOLDING PLASTER

Molding plaster, called Stolit LM.-84, for making patterns and plates for use on jolt-squeeze molding machines is capable of withstanding the jolting action of these machines. Material consists of a powder and a special liquid hardening additive. These are mixed together with cold water prior to pouring to make the pattern or mold. Distributed through **Drew Brown Ltd.**, 5410 Ferrier St., Montreal 9, Canada.

For More Details Circle No. 408—Page 326

BELT CONVEYOR ROLLS

Conveyor roller shaft turns in ball bearings which are mounted in removable studs. System is said to

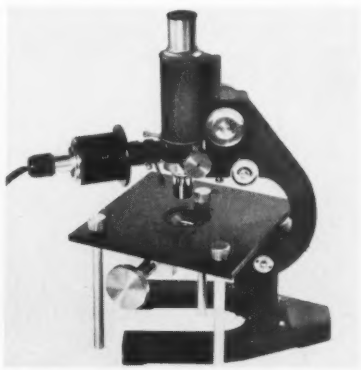


cut maintenance and replacement costs on rolls and return idlers as it is not necessary to stock rollers, just the studs. Maintenance is performed at the conveyor by removing damaged or worn studs and replacing with new assembly. Rollers, complete with removable studs, are supplied in diameters from 2⅜ to 4 in. All sizes supplied in lengths from 12 to over 36 in. Made by **Bearings Inc.**, 3634 Euclid Ave., Cleveland 15, O.

For More Details Circle No. 409—Page 326

STRAIN VIEWER

Flinn strain viewer provides a means for microscopic examination of metals and other solids under stress. The unit consists of a specimen table with a knife-edge loading device for the transverse loading of a miniature polished bar of material. Resulting plastic strain and mode of fracture can be viewed at all conventional magnifications including 1000 diameters. Specimen table has three legs for use with a bench type microscope. Legs may be removed if table is to be placed on the stage of a metallurgical microscope. Frac-



ture initiation and propagation, slip, twinning and phase transformations resulting from stress can be viewed and photographed. Made by **Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 410—Page 326

LIGHT-DUTY FORK TRUCKS

Shorter turning radius and extra maneuverability are gained in applications where operating conditions are not too severe with a new series of fork lift trucks recommended for normal and light-duty applications. Model FTA-50 has 5000 lb capacity and FTA-70 has 7000 lb capacity. Other models will be manufactured soon. The FTA line incorporates the same power and steering axles, motors, braking systems, heavy-duty controls, steering system and other features of the company's FT line of heavy-duty trucks. Made by **Baker-Raulang Co.**, 1223 West 80th St., Cleveland 2, O.

For More Details Circle No. 411—Page 326

LITERATURE for Foundrymen

SILICATE BINDERS

Bulletin introduces Jet CO_2 Bond as one of a series of compounded silicate binders for the CO_2 process. Products have been developed to assure maximum strength and hardness, easy ramming, fast gassing and improved collapsibility.—**Swan Finch Oil Corp.**, 5849 West 66th St., Chicago 38, Ill.

For More Details Circle No. 412—Page 326

METAL FINISHING

Booklet, "Modern Metal Finishing with 3M PG Wheels," presents case history applications of company's polishing and grinding wheels. Wheels are formed from hundreds of die cut, cloth-backed coated abrasive leaves locked in a hub.—**Minnesota Mining & Mfg. Co.**, 900 Fauquier St., St. Paul 6, Minn.

For More Details Circle No. 413—Page 326

FOUNDRY EQUIPMENT

Shakeouts, sand screens, sand conditioning equipment, lump crushing equipment conveyors, feeders and related foundry equipment are illustrated and described in catalog F-7.—**Simplicity Engineering Co.**, Durand, Mich.

For More Details Circle No. 414—Page 326

SILICONE LUBRICANTS

Properties and performance of silicone oils, greases and compounds available in quantity are discussed in reference 6-101. Typical applications are listed and technical data are presented in tables and graphs.—**Dow Corning Corp.**, Midland, Mich.

For More Details Circle No. 415—Page 326

CORE OILS

Performance characteristics and application information of company's Linoil "family" of products is provided in bulletin 450. Binders for conventional oil-sand, air setting, CO_2 and resin-bonded cores are covered.—**Archer-Daniels-Midland Co.**, 2191 West 110th St., Cleveland 2, O.

For More Details Circle No. 416—Page 326

SAFETY SHOES

Catalog illustrates and describes over 90 safety shoe styles, available in 6500 different designs, lasts, sizes and widths.—**Hy-Test Safety Shoes, Division of International Shoe Co.**, 1509 Washington Ave., St. Louis 3, Mo.

For More Details Circle No. 417—Page 326

MOLD DRIER

Specifications, general information and suggested time, space and money saving applications for use of mold

USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES, AND LITERATURE DESCRIBED IN THIS SECTION

FOUNDRY
MAY 1957

401	421	441	461	481	501
402	422	442	462	482	502
403	423	443	463	483	503
404	424	444	464	484	504
405	425	445	465	485	505
406	426	446	466	486	506
407	427	447	467	487	507
408	428	448	468	488	508
409	429	449	469	489	509
410	430	450	470	490	510
411	431	451	471	491	511
412	432	452	472	492	512
413	433	453	473	493	513
414	434	454	474	494	514
415	435	455	475	495	515
416	436	456	476	496	516
417	437	457	477	497	517
418	438	458	478	498	518
419	439	459	479	499	519
420	440	460	480	500	520

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

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COMPANY _____

PRODUCT MANUFACTURED _____

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CITY _____ ZONE _____

STATE _____

This card good in U.S. and Canada only—Expires July 15, 1957

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FOUNDRY
MAY 1957

401	421	441	461	481	501
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403	423	443	463	483	503
404	424	444	464	484	504
405	425	445	465	485	505
406	426	446	466	486	506
407	427	447	467	487	507
408	428	448	468	488	508
409	429	449	469	489	509
410	430	450	470	490	510
411	431	451	471	491	511
412	432	452	472	492	512
413	433	453	473	493	513
414	434	454	474	494	514
415	435	455	475	495	515
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Penton Building

Cleveland 13, Ohio

Reader's Service Dept.

drier are found in bulletin MD602.—**Milwaukee Heat Transfer Division, Milwaukee Gas Engineering Corp.,** 4046 North Teutonia Ave., Milwaukee 9, Wis.

For More Details Circle No. 418—Page 326

ENGINEERING SERVICE

Booklet, "This Is Kaiser Engineers," details the capability and experience of company's engineering talent available for the planning, design and construction or remodeling of industrial facilities. Experience in the application of the oxygen converter process to steel foundries supplements its foundry design and construction experience.—**Kaiser Engineers, Division of Henry J. Kaiser Co.,** Kaiser Bldg., Oakland 12, Calif.

For More Details Circle No. 419—Page 326

AUTOMATIC AIR FILTERING

Folder highlights automatic Roll-O-Matic filter available on Herman Nelson Roll-O-Vent units for heating, ventilating and cooling. The system eliminates filter changes and maintains constant air flow.—**American Air Filter Co.,** 215 Central Ave., Louisville 8, Ky.

For More Details Circle No. 420—Page 326

CORE AND MOLD WASH

Bulletin K-1 provides general information and suggestions for using Korglaze, a vehicle to carry powdered refractories for coating cores and molds to improve surface finish, save cleaning costs and reduce machining costs.—**United Oil Mfg. Co.,** 1429 Walnut St., Erie, Pa.

For More Details Circle No. 421—Page 326

CONCRETE

Folder describes Concretite, a liquid concentrate which, when added to water in the mix, gives extreme compressive strength to concrete or portland cement mortar.—**Stonhard Co.,** 1306 Spring Garden St., Philadelphia 23, Pa.

For More Details Circle No. 422—Page 326

FLOODLIGHTING

Illustrated catalog covers line of cast aluminum floodlighting equipment and accessories.—**Stonco Electric Products Co.,** 333 Monroe Ave., Kenilworth, N. J.

For More Details Circle No. 423—Page 326

VORTEX BURNER

Bulletin 111 provides dimension and output data and general information on a compact, self-contained vortex burner featuring integral construction of the burner and combustion chamber. Four standard models are offered with outputs ranging to 18 million Btu.—**Thermal Research & Engineering Corp.,** Conshohocken, Pa.

For More Details Circle No. 424—Page 326

METAL-CUTTING BAND SAWS

Metal-cutting band saws are made of controlled analysis steel heat treated and tempered to offer improved cutting performance and long life under severe operating conditions. Standard tooth shape is provided for cutting most ferrous and hard nonferrous metals. Skip tooth blades are provided for cutting soft metal, wood and plastic. Hook tooth saws for cutting gummy material also are available. Blade widths range from ⅛ to 1 in. Standard tooth blades are furnished with either regular or wavy set teeth. Skip and hook tooth blades are regular set only. Made by **Heller Tool Co.,** Newcomerstown, O.

For More Details Circle No. 425—Page 326

SLIP JACKETS

Adjustable and self-aligning slip jackets are made in any length and in depths up to 26 in. Jackets can

be made with special hardware so that cope and drag can be varied in about ¼ in. increments of vertical height. Jackets are designed so that one jacket will fit many molds by moving the bolts to different holes. Made by **Products Engineering Co.,** Cape Girardeau, Mo.

For More Details Circle No. 426—Page 326

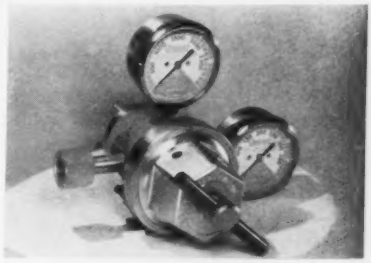
PLANT SAFETY AIDS

Kit of safety aids contains a set of 11 x 14 in. cartoon posters for display around the plant, a group of colorful directional and warning signs and a guide booklet on correct lift truck operation. The material is intended to add emphasis to industrial plant-wide safety programs. Prepared by **Towmotor Corp.,** 1226 East 152nd St., Cleveland 10, O.

For More Details Circle No. 427—Page 326

CO_2 REGULATOR

Carbon dioxide regulator, the Oxweld R-69-400, for use on CO_2 cylinders or manifolds, operates effectively at any delivery pressure up to 200 psi. Sensitive controls adapt the regulator to a wide range of applications including regulating flow of CO_2 in foundry coremaking operations.



The regulator operates on a two-stage principle of pressure reduction. Cylinder pressure is first reduced to a steady, intermediate stage and then to the desired delivery pressure. Made by **Linde Air Products Co.,** 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 428—Page 326

GRAB BUCKET HINGE

Jamming and breakage of gear-type alignment devices for grab buckets is now eliminated by a link-type alignment hinge specially developed for use on buckets handling slag, ore and other hard materials. The hinge is made of high-tensile steel and is available only by Mead-Morrison buckets. Operation is by the interaction of a linkage of steel plates that replace the gear teeth of conventional hinge alignment devices. Made by **McKiernan-Terry Corp., Mead-Morrison Division,** Harrison, N. J.

For More Details Circle No. 429—Page 326

WHEEL DRESSERS

Wheel dressers feature a quick-change cutter assembly and a handle with a bicycle grip to provide positive yet comfortable control. Cutters can be changed without completely dismantling the assembly by

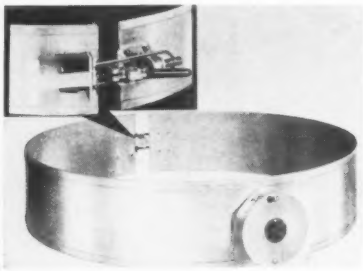
loosening one screw. Six-holed bearings in each handle actually provide six sets of bearings because should the bearings become damaged or worn, they may be turned to the next hole. Cutters are of milled hardened steel. Three sizes of dressers are supplied—for wheels up to 10 in. in

diam, for wheels 10 to 16 in. in diam and wheels 15 in. in diam and larger. Made by **Machine Products Corp.**, 125 Hollier St., Dayton, O.

For More Details Circle No. 430—Page 326

DRUM HEATER

Drum heater for heating 55-gal steel drums containing materials that require heating to facilitate removal

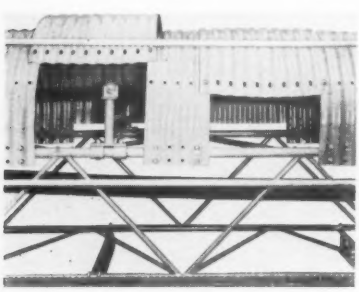


from the container features a quick action toggle clamp, built-in three heat switch and wiring circuits said to assure uniform heating at any one of three settings. Actual heat input into the drum, without added thermal insulation, is said to be 65 to 85 per cent of the total generated wattage, depending upon the condition of the container and the heat absorbing properties of the contents. Two capacities, 3000 w, 230 v or 2500 w, 115 v, are available. Made by **Acra Electric Corp.**, 9909 Pacific Ave., Franklin Park, Ill.

For More Details Circle No. 431—Page 326

TRUSS FRAME CONVEYOR

Conveyor consists of standardized, prefabricated sections of various lengths which can be bolted together to make up the total length required. Each section is made of 4, 1½-in. pipe chords connected by ¾-in. pipe diagonals to form a laced frame



truss. Vertical diagonals are welded to the chords, horizontal diagonals are bolted to the chords. Idlers, walkways, cover decking, hoods, supports and special items clamp to the pipe for location as desired. Drive and tail terminals are adaptable to a variety of pulley sizes, motor mounts, wipers, hold-back brakes and take-ups. Trusses are available in all standard belt widths and in two depths: 24 in. c/c for spans up to 50 ft and 42 in. c/c for spans up to 100 ft. Made by **Joy Mfg. Co.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 432—Page 326

COMPRESSED AIR TRAP

Compressed air and gas trap discharges condensate from compressed air or gas lines by a combination of magnetic, pneumatic and automatic action. Pilot valve snaps open and shut through magnetic action to prevent air leakage, valve chattering and excess pressure drop. Pressure energy in the pneumatic system drives the piston which opens and closes the main discharge valve. Continuous operation with a minimum of maintenance time is assured as there are only two moving parts in the trap—the float arm and the

piston assembly. A single antifriction pivot connects these two parts. Inlet pipe size is ¾-in. NPT and discharge pipe size is ¼-in. NPT. Pressure range is 10-200 psig. Made by **Hankinson Corp.**, 951 Banksville Rd., Pittsburgh 16, Pa.

For More Details Circle No. 433—Page 326

LIQUID PARTING COMPOUND

Safco Jet Parting is a liquid compound for use with cores made with core oil or resin binders to prevent sticking and provide easy removal of the cores from the boxes. It can be brushed or sprayed on patterns or coreboxes. Flash point is above 300°F. Parting is available in standard bulk containers or in 18-oz aerosol cans branded E Z Jet Parting. Made by **Swan Finch Oil Corp.**, 5849 West 66th St., Chicago 38, Ill.

For More Details Circle No. 434—Page 326

LITERATURE for Foundrymen

CO_2 PROCESS

"A Practical Guide to the CO_2 Process" presents the advantages of the process, equipment and materials required and procedures to follow to assure success with this method.—**International Foundry Supply Co.**, Box 1053, Reading, Pa., or **Textile Chemical Co.**, Front & Spruce Sts., Reading, Pa.

For More Details Circle No. 435—Page 326

GRAY IRON

Booklet reviews the essential role of gray iron in modern manufacturing and notes the part played in producing gray iron castings by two basic raw materials—pig iron and foundry coke.—**Coke & Iron Division, Pittsburgh Coke & Chemical Co.**, Grant Bldg., Pittsburgh 19, Pa.

For More Details Circle No. 436—Page 326

CORE AND MOLD WASHES

Bulletin 17 describes eight core and mold washes for ferrous and nonferrous foundries and charts methods of application for each one.—**United States Graphite Co., Division of Wickes Corp.**, Saginaw, Mich.

For More Details Circle No. 437—Page 326

HARDNESS TESTER

Bulletin describes the functions and operating principles of an air-operated Brinell hardness testing machine with which accurately regulated air pressure applies a selected load of up to 3000 kg to the specimens. — **Tinius Olsen Testing Machine Co.**, 5812 Easton Rd., Willow Grove, Pa.

For More Details Circle No. 438—Page 326

CONVEYOR BELTS

Catalog 25CB details style designations, tension ratings, minimum recommended pulley diameters and minimum belt width for good troughing of conveyor and elevator belts. Hot-material belts for temperatures from 150 to 350°F also are described. —**Raybestos-Manhattan Inc., Manhattan Rubber Division**, Passaic, N. J.

For More Details Circle No. 439—Page 326

AIR CYLINDERS

Specifications, dimensions, features, applications and ordering information for heavy-duty air cylinders are found in catalog 109-A.—**S-P Mfg. Corp.**, Solon, O.

For More Details Circle No. 440—Page 326

GRINDING WHEELS

Folder provides general information and recommendations for company's "X" type resinoid grinding

wheels for portable, stand or swing frame grinding applications. — **Precision Grinding Wheel Co.,** Philadelphia 36, Pa.

For More Details Circle No. 441—Page 326

AIR-MOTOR GRINDERS

Bulletin 61 illustrates and describes the important operating features of a horizontal grinder for metal removal on castings, welds or any metal construction, a right-angle grinder for use on flat or curved surfaces and an abrasive belt attachment. All are air-motor powered.—**Airetool Mfg. Co.,** Springfield, O.

For More Details Circle No. 442—Page 326

STEEL CARBURIZATION

Bulletin F-553, "The Rite Way to Carburize Steel," highlights the advantages of using Carb-Rite, a carbonaceous material containing no phosphorus, 96 to 98 per cent fixed carbon and low sulphur, as a carburizing agent in the manufacture of iron and steel.—**Carb-Rite Co.,** 1815 Halsted St., Chicago Heights, Ill.

For More Details Circle No. 443—Page 326

OSCILLATING CONVEYORS

A guide to selection and application of stock size Coilmount oscillating conveyors is found in book 2644. A capacity selection chart, engineering data and diagrams, dimensions and specifications are included.—**Link-Belt Co.,** Prudential Plaza, Chicago 1, Ill.

For More Details Circle No. 444—Page 326

ZIRCON CORE COATING

Bulletin F-129 details a zircon-base core and mold coating that has a fusion point of 4000°F and can be used on shell molds, resin-bonded and air set cores.—**Frederic B. Stevens Inc.,** 1822 Eighteenth St., Detroit 16, Mich.

For More Details Circle No. 445—Page 326

ELECTRIC MOTORS

Application guide 102 helps the user of electric motors select the right motor for his specific application. Information covers line of polyphase, single phase, direct and alternating current motors, gearmotors and motor generators.—**Century Electric Co.,** 1806 Pine St., St., Louis 3, Mo.

For More Details Circle No. 446—Page 326

MACHINE TOOLS

Catalog 5700 covers specifications, engineering features, attachments and accessories for engine lathes, toolroom lathes, turret lathes, vertical spindle milling machines, bench shapers, drill presses and pedestal tool grinders.—**South Bend Lathe Works,** 425 East Madison St., South Bend 22, Ind.

For More Details Circle No. 447—Page 326

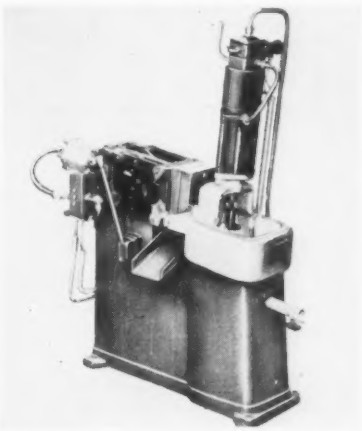
ENGINEERING SERVICE

An abrasive and abrasive belt machine engineering service called Maximum Automation Potential gives manufacturers recommendations by mail for improved metal removal methods in an effort to increase mechanization and automation of stock removal methods through use of coated abrasive belts, belt machines and special devices. Service is available from the **M.A.P. Dept., Carborundum Co.,** Niagara Falls, N. Y.

For More Details Circle No. 448—Page 326

DIE CASTING MACHINE

High-speed die casting machine is designed for continuous operation at free cycling speeds up to 3000 shots per hr. Maximum shot capacity is 1 lb. The machine is designed in units so that any part of the ma-

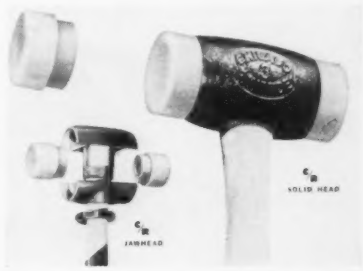


chine can be removed rapidly and replaced to minimize down time. The machine is of British manufacture and said to be the latest and most advanced model of the largest selling line of high-speed die casting machines in use there. Imported by **British Machines & Foundry Supplies Ltd.,** Port Washington, N. Y.

For More Details Circle No. 449—Page 326

NYLON HAMMERS

Jawhead and solid head hammers feature replaceable molded nylon faces that reportedly possess superior wearing characteristics and resistance to acids, oils and moisture. Like rawhide, the nylon faces will not chip, spark, mushroom nor mar polished or painted finishes. They will not shrink nor loosen in the head or face bore of the hammer. Additional striking surface is provided by a new shoulder design whereby the outside diameter of the face is flush with the head casting. This minimizes the danger of sparking caused by the head striking the work on inaccurate blows. The hammers may be ordered with faces of either nylon or water buffalo rawhide. Nylon faces are interchangeable with rawhide faces in new hammers as



well as those sold previously. Made by **Chicago Rawhide Mfg. Co.,** 1301 North Elston Ave., Chicago 22, Ill.

For More Details Circle No. 450—Page 326

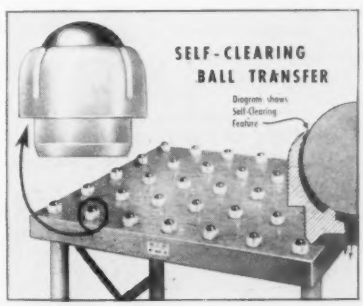
HIGH-SPEED GRINDER

Grinding, deburring, cutting, polishing, die and mold finishing are among the uses for high-speed, air-powered, "pencil-size" grinder. It operates at 100,000 rpm at 80 psi. Tool wear virtually is eliminated as all of the bearing load is carried by the air stream. The grinder, Model GA-125, comes equipped with a Bellows Model FL-125 air filter lubricator and 6 ft of nylon-reinforced hose. Made by **Bellows Co.,** Akron 9, O.

For More Details Circle No. 451—Page 326

TRANSFER UNIT

Ball transfer unit features a design that has the bottom of the retaining cup entirely open to permit continuous self-clearing and prevent clogging. The cup is made of Metzgar-Nylo, designed to support the ball on friction-reducing protru-



sions that require no lubrication. It is slotted to permit the ball to be snapped in or out without tools. Standard unit is made with a 1-in. chrome alloy steel ball but can be furnished with stainless steel, monel metal, Metzgar Nylo or other special balls. The manufacturer also offers a line of ball transfer adjustable

Foseco®

FEEDEX®

FERRUX

FEEDOL ...

Exothermic Compounds

- **eliminate shrinkage and piping**
- **keep feed metal molten, longer**
- **aid directional solidification**
- **permit reduction in riser size — more castings poured from each heat**
- **smaller risers reduce melting and cleaning costs and improve casting finish**
- **chemical and physical properties of the metal are not altered**

Have you considered the advantages FOSECO exothermic compounds offer *your foundry?* Over the past few years, many American foundrymen have established FEEDEX, FERRUX and FEEDOL as reliable aids in producing consistently sound castings. Grades are available for all metals.

FOSECO FEEDEX is an exothermic anti-piping compound which can be molded to any shape and used as sleeves, feeding pads, breaker cores, etc.

FOSECO FERRUX is a high heat producing and insulating hot topping compound for iron and steel.

FOSECO FEEDOL is a high heat producing and insulating hot topping compound for aluminum and copper-based alloys.
Investigate this range of FOSECO exothermic compounds to see how they can help *your foundry* overcome the costly problem of scrap loss due to shrinkage.

Many of the foundries exhibiting at the AFS Castings Congress and 1st Engineered Castings Show at Cincinnati, use FOSECO exothermic products.

FOUNDRY SERVICES, INC.

2000 BRUCK STREET COLUMBUS 7, OHIO

In Canada: FOUNDRY SERVICES (CANADA) LTD., 201-7 Alice St., Guelph, Ontario

Clip and mail this coupon today. We'll be happy to send you a leaflet describing FEEDEX, FERRUX and FEEDOL applications.

Name_____

Company_____

Address_____

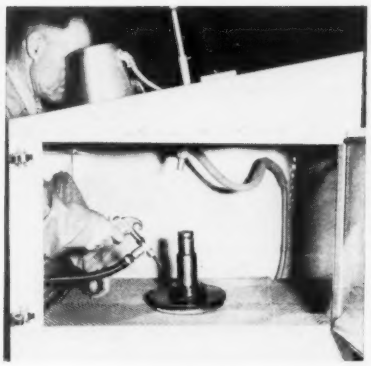
City_____ State_____

height tables and ball transfer stands (permanent base or tripod). Made by **Metzgar Conveyor Co.**, 412 Douglas St. N.W., Grand Rapids, Mich.

For More Details Circle No. 452—Page 326

SANDBLAST CABINET

Sandblast cabinet can be used with an adjustable, mounted blast unit or with a trigger-controlled hand blast

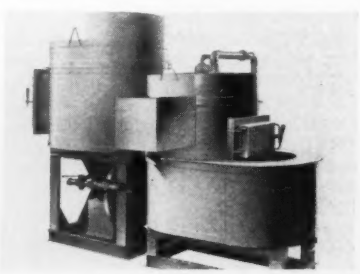


gun. The double-duty feature lends itself to production runs as well as work containing angles and crevices which are awkward to handle with any fixed unit. The mounted unit may be raised or lowered to more conveniently blast the object and it may be raised out of the way when the hand gun is used. Blast action of the mounted unit is controlled by a stop-start foot valve. Made by **Cyclone Sandblast Equipment,** 42 Clara St., San Francisco 7, Calif.

For More Details Circle No. 453—Page 326

DOUBLE CHAMBER FURNACES

Double chamber furnaces incorporate combustion burners in each unit for aluminum breakdown and holding in die casting, permanent mold



and sand casting operations. A variety of melting and holding capacities are provided with melt rates from 450 to 1600 lb per hr and holding capacities ranging from 680 to 2450 lb. Each furnace provides a mild firing condition to insure extended refractory life, gas-free metal and cool working conditions. While

WANT TO MELT A MOUNTAIN OF METAL?

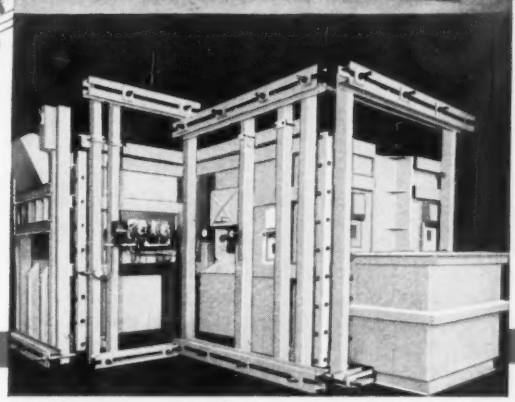
THESE BIG STROMANS WILL DO IT...BUT FAST!

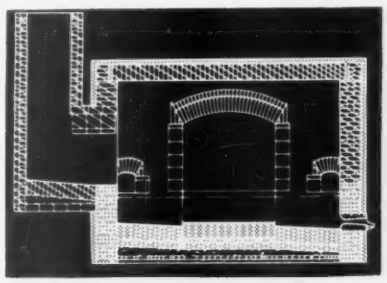
STROMAN LARGE SIZE REVERBERATORY FURNACES

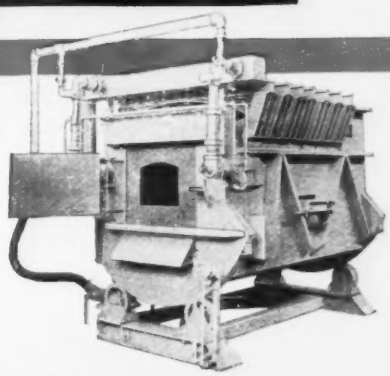
For Melting Unlimited Capacities of Aluminum, Zinc or Brass

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country, they have proved their ability to deliver large tonnages of metal, are easy to work with and around . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority.

Furnaces of this type are designed to meet customers' individual requirements . . . let our engineers show you how to achieve utmost efficiency and economy in your melting operations.

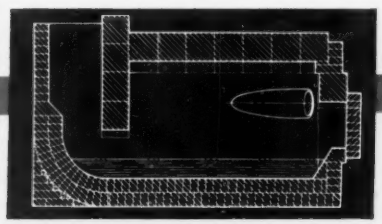




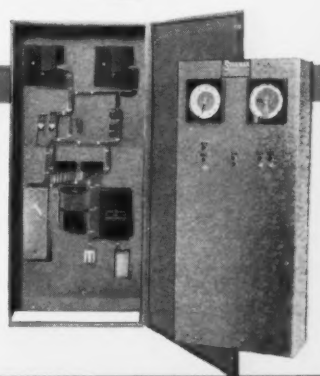


STROMAN TYPE "SW" CRADLE TILTING FURNACE FOR ALUMINUM MELTING SIZES FROM 1,000 TO 3,000 POUNDS

An ideal furnace for breakdown to supply hot metal to holding furnaces for die casting or permanent mold. Also for distribution to the molding floor in sand casting foundries. Tilted by means of an air or hydraulic ram. Furnished complete with gas or oil burners or combination burners, blower to furnish combustion air, and lining made of standard fire brick shapes.



Automatic temperature and safety controls available if desired.



STROMAN CUBICLE TYPE CONTROL PANEL

Stroman design monitor for furnace metal temperature, refractory temperature, high limit blower motor, circuit, electric ignition, and flame safety control, with completely automatic built-in warning system.

Don't forget STROMAN make furnaces for the melting of brass, bronze, aluminum, magnesium, grey iron and all other metals in sizes to meet your needs no matter how large or small.

Write for complete catalogue today!

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF THE PETERSEN OVEN CO. • FRANKLIN PARK, ILL.

A 24-in.-dia. Stearns electromagnetic pulley automatically removes scrap iron from foundry sand on 16-inch conveyor. Note clean scrap heaped below.

SCRAP IRON LOSS ELIMINATED AT FOREST CITY FOUNDRY

Stearns Magnetic Pulley recovers three tons of scrap metal from 20 tons of sand per day

A powerful Stearns electromagnetic pulley is an important part of the shaker unit at The Forest City Foundry Company, Cleveland, Ohio. Core and molding sand, removed from rough castings by the shaker, travel on a conveyor over the magnetic pulley. Core wires, rods, runners, gates and other iron in the sand are pulled out of the moving material.

Moreover, the magnetic pulley salvages three tons of valuable, *clean* scrap iron that otherwise would be discarded with the waste sand.

"Since we installed the system five years ago, sand and scrap reclaiming and disposal are no longer a problem," says Plant Engineer Jim Quarrie. "We like the Stearns pulley because it does a very satisfactory job with little maintenance and operating expense."

Many modern foundries are finding magnetic answers to difficult and dangerous handling problems. Call your Stearns representative or write today for free Bulletin 303-DG.

37

STEARNS MAGNETIC PRODUCTS

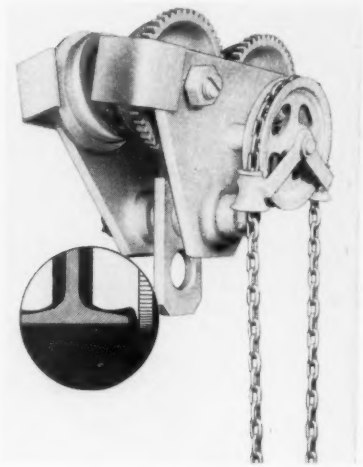
635 SOUTH 28TH STREET • MILWAUKEE 46, WISCONSIN

the furnaces are individual units, each is interchangeable with the other. Automatic temperature controls, combustion safeguards and control panels are available. Made by **Stroman Furnace & Engineering Co.**, Franklin Park, Ill.

For More Details Circle No. 454—Page 326

TROLLEY LINES

Two new lines of I-beam trolleys—a push type and a hand geared type (shown)—have capacities from 3 through 10 tons. Both lines eliminate all need for lubrication by featur-



ing life-lubricated bearings throughout. Tread wear is minimized by use of flame-hardened wheels that feature tread crowning to provide easy rolling characteristics. Crowning also allows the trolleys to operate on all I-beam flange tapers from 0 through 15 degrees. Standard flange taper is 9 degrees. All capacities are adaptable to a wide range of I-beam sizes by rearrangement of spacer washers on the cross shaft. Made by **Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division**, Muskegon, Mich.

For More Details Circle No. 455—Page 326

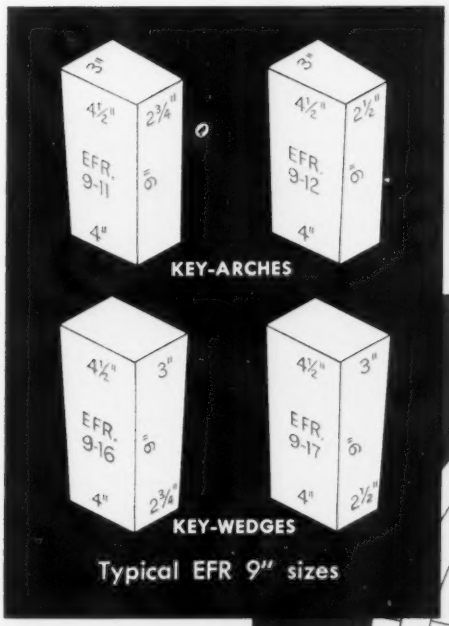
AUTOMATIC CAFETERIA

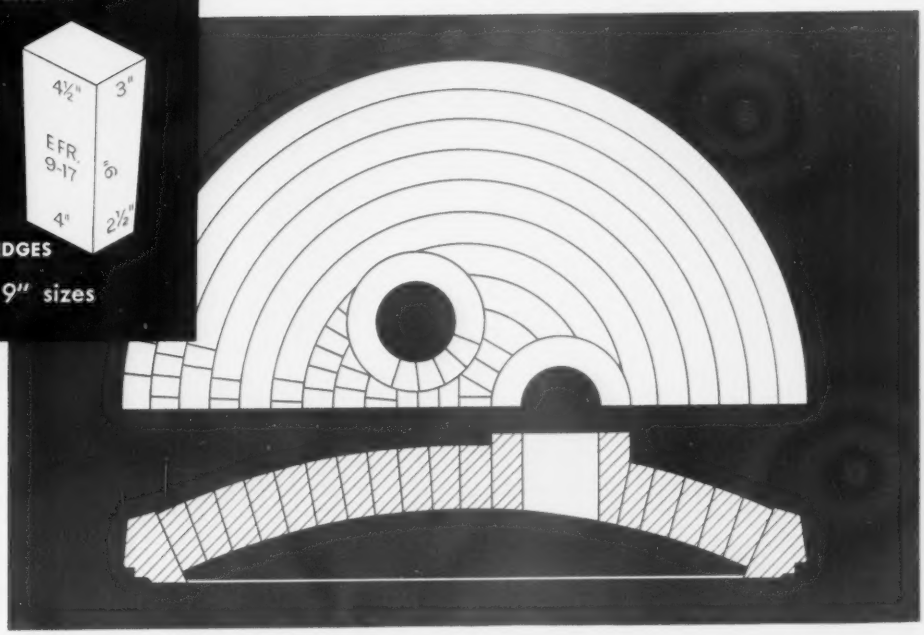
Automatic cafeteria designed to meet needs of office and in-plant workers serves juices, soups, chicken and beef pies, salads, spaghetti and meat balls, pastries, coffee and other foods at the touch of a button. Precooked foods are held from 32 to 40°F until meal time when they are heated to preset temperatures. Unsold foods are returned to refrigeration temperature at the end of the meal period. Machine is adjustable to skip holidays or weekends. Coins may be accepted only during predetermined meal time. Dimensions are 14 in. wide, 22 in. deep at the floor,

For electric furnace roofs

Harbison-Walker EFR design

provides important benefits





Harbison-Walker EFR (electric furnace roof) brick are modified 9″ key-arches and key-wedges, designed for use in combination with a large proportion of standard 9 x 4½ x 3″ sizes in the construction of roofs of any diameter and rise.

The use of these EFR shapes insures a close fit of the brick and roof construction of best workmanship.

The number of different sizes required for building a roof with the aid of the EFR brick is greatly reduced for some designs.

Bricklaying is simplified and much time is saved when EFR brick are used.

EFR brick are power pressed by which method of forming all of the most desirable physical properties are secured.

Roofs built of smaller brick units in preference to large special shapes generally prove to be more serviceable. The smaller sizes are more resistant to thermal shock.

The EFR shapes cost less than large special shapes and since they are used with standard 9″ sizes in predominance, the overall cost is considerably reduced.

H-W High Alumina Castable and Korundal Ramming Mix sometimes are used to advantage as a monolith to facilitate easy fitting in the center section.

The EFR brick, together with the standard 9″ sizes needed for complete roofs, are furnished in the types and classes of refractories best suited for the various operating conditions. For example, they are made in the following brands: STAR and VEGA silica brick; H-W MULLITE; KORUNDAL; and various Harbison-Walker superduty brands, such as ALAMO and H-W SUPER SAVAGE.

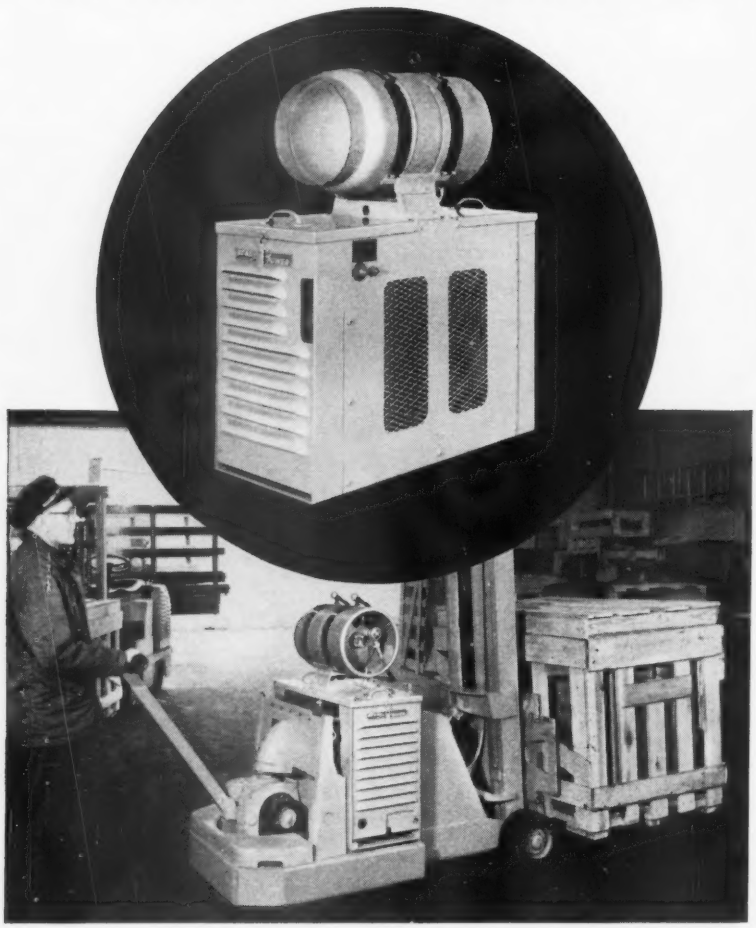
The combination of quality, H-W Technical Service and balanced selection based on availability of all types and classes of refractories from one source, provides maximum economy.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Most Complete Refractories Service
GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

Circle 750 on Inquiry Card—Page 51

LPG-ELECTRIC

The Versatile READY-POWER way!



New! Bantam Model W12 for Electric Powerized Hand Trucks

Ready-Power combines full electric power *with no fatigue* AND the economy and low maintenance of LP-gas in one compact new power unit. Installation is quick and easy on any make of motorized electric hand truck with adequate sized power compartment. Bantam model W12 accommodates an interchangeable 20-pound fuel cylinder, includes a quick-disconnect fuel line coupling for safety, has removable end, side and cover plates for easy accessibility. LP-gas components are listed by Underwriters' Laboratories and comply with Factory Mutual recommendations. It's easy to convert your present trucks to this modern, full-production power. Specify "Ready-Power" when ordering new trucks. Write for information.

READY-POWER

The READY-POWER Co., 3819 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electic Power Units for Industrial Trucks

30 in. from floor to top of the serving shelf, 32 in. deep at the serving shelf and 81 in. high. Made by **Rudd-Melikian Inc.,** Hatboro, Pa.

For More Details Circle No. 456—Page 326

HELMET HEADGEAR

Headgear for helmets and face shields is made of plastic and adjusts to the required head size by a turn or two of an adjusting ratchet.

Headgear is impervious to perspiration or chemical action and is easily cleaned. The headgear is available on all Cesco welding helmets and face shields. Made by **Chicago Eye Shield Co.,** 2300 Warren Blvd., Chicago 21, Ill.

For More Details Circle No. 457—Page 326

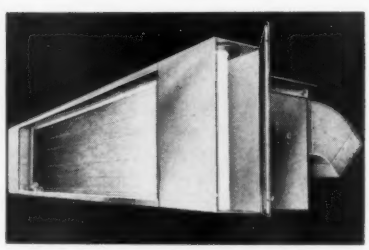
PLASTIC FRAME GLASSES

Plastic frame glasses are similar to company's metal frame safety glasses and are said to provide the pleasing appearance of personal glasses with an increased viewing area over previous styles. Complete selection of frames in flesh, bronze and green shades in the 700 Series is available. Made by **Sellstrom Mfg., Co.,** Palate, Ill.

For More Details Circle No. 458—Page 326

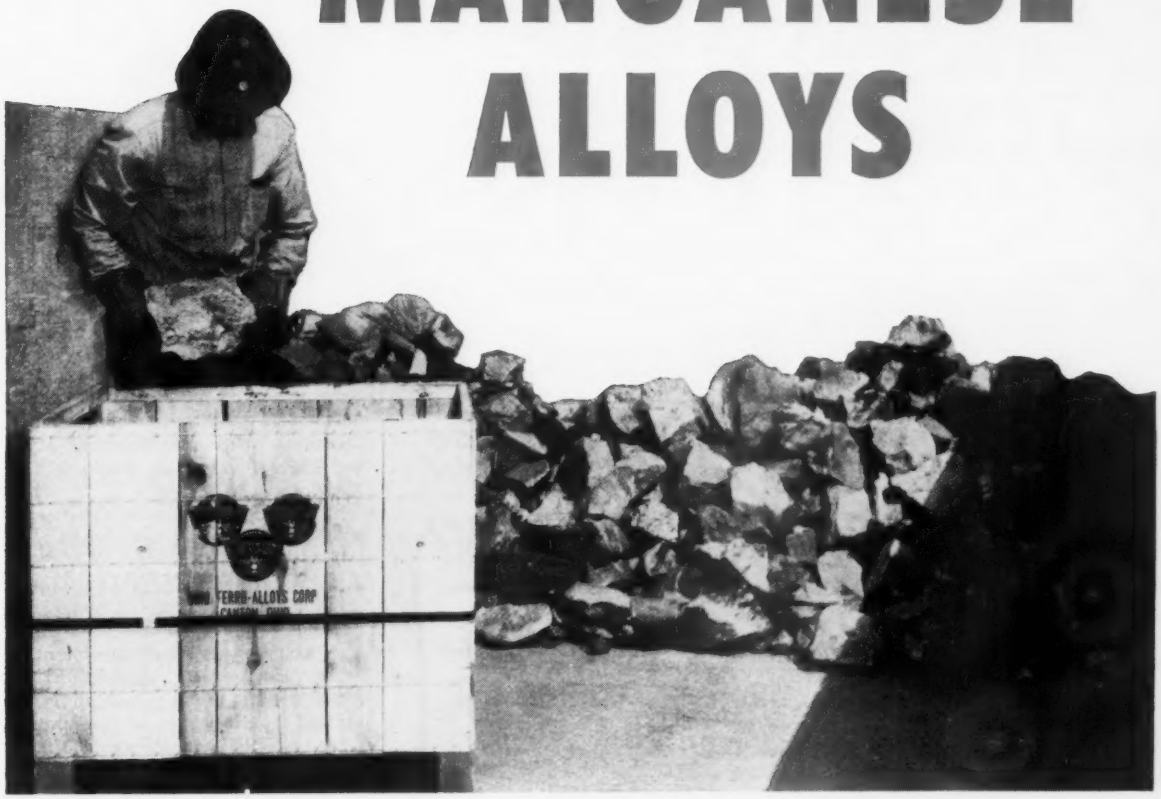
AUTOMATIC AIR FILTRATION

Automatic air filtration and "once a year maintenance" for air handling has been introduced into Roll-O-Vent industrial unit heaters, heating and ventilating units and air conditioners.



Filtration is accomplished by a continuous glass fiber curtain that moves horizontally through the entering air stream of the unit just ahead of the coils and fan sections. Fresh media is supplied automatically to the air

MANGANESE ALLOYS



STANDARD FERROMANGANESE
- 74 - 76% Manganese
- 78 - 82% Manganese

MEDIUM CARBON FERROMANGANESE

SILICOMANGANESE
1. 50% Max. Carbon Grade
2. 00% Max. Carbon Grade
3. 00% Max. Carbon Grade

MANGANESE BRIQUETS

SILICOMANGANESE BRIQUETS

All our Manganese Ferro Alloys are electric furnace products, low in objectionable impurities. They are available in a wide range of sizes for furnace or ladle addition or briquetted for cupola addition.

Whether your needs be large or small you can count on us for Manganese Ferro Alloys.

Ohio Ferro-Alloys Corporation
Canton, Ohio

SALES OFFICES

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Minneapolis • Philadelphia • Pittsburgh • San Francisco • Seattle

Circle 752 on Inquiry Card—Page 51

stream by an automatic timer to provide constant filter efficiency and automatic disposal of contaminated media. Media is disposed of by removing the spool of dirty media and replacing it with a clean spool. Made by **American Air Filter Co.**, 215 Central Ave., Louisville 8, Ky.

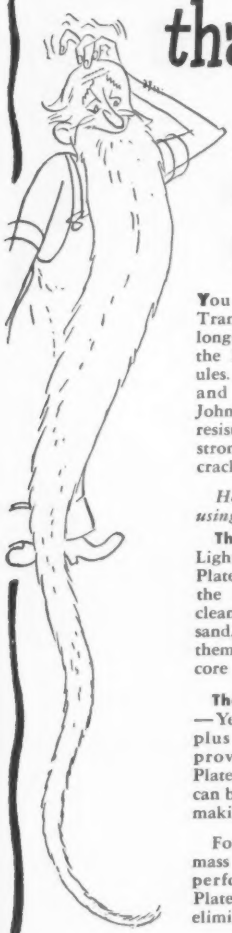
For More Details Circle No. 459—Page 326

SNAGGING WHEELS

Foundries can obtain snagging wheels combining fast cutting action of softer grades with the long wear of hard wheels. Manufacturer reports this is possible by a chemical additive to conventional resinoid bonds, which acts as an internal lubricant to increase the abrasive cutting action of resinoid bonded wheels. Where present cutting rate is satisfactory, the additive in harder grade will give longer wheel life. Where wheel life is satisfactory, the additive in the same grade will provide increased cutting action. Made by **Simonds Abrasive Co.**, Tacony & Fraley Sts., Philadelphia 37, Pa.

For More Details Circle No. 460—Page 326

Looking for core plates that LAST LONGER?



. . . then use TRANSITE CORE PLATES that stay on the job year in, year out

You can rely on durable Transite* Core Plates to give long-term service, even under the heaviest foundry schedules. Made of fibrous asbestos and cement, by a special Johns-Manville process, they resist shock and corrosion, are strong and durable, will not crack or break easily.

Here are more reasons for using Transite Core Plates:

They speed production—Light-weight Transite Core Plates are easier to handle on the job. They're easier to clean, too . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

They maintain accuracy—Years of foundry service, plus exhaustive tests, have proven that Transite Core Plates do not warp readily . . . can be used for precision core making indefinitely.

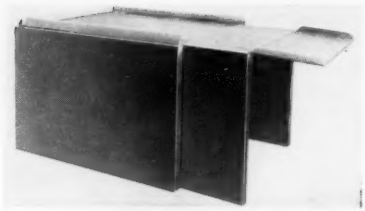
For core plates of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 14, New York 16, N.Y.

JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES

Made of Asbestos



SELF-LEVELING PLATFORM

Self-leveling platform can be installed at ground level or in loading docks and is capable of rising from ground level to any truck height up to 60 in. in 20 seconds or less. The hydraulic unit has no plates to throw over to bridge gap between truck bed and loading platform. The plate is hinged and rises to truck bed, stopping when level. Sealed hydraulic mechanism requires no maintenance, according to the manufacturer. Made by **Field Engineering Products Co.**, Jamestown, N. Y.

For More Details Circle No. 461—Page 326

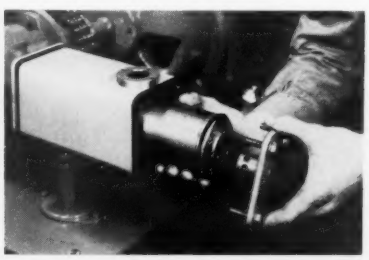
AIR SETTING CEMENT

Crystolon RC 2351 air setting cement is designed for use in incinerators, boilers, gas generators or other high temperature applications in which minimum slag buildup is essential. Material is a fine-grained silicon carbide cement, sized 30 mesh and finer, with the addition of an air-setting constituent. Highly refractory, it has a melting point of about 2750°F. The cement can be troweled or sprayed on surfaces to be treated. Made by **Norton Co.**, Worcester 6, Mass.

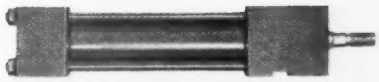
For More Details Circle No. 462—Page 326

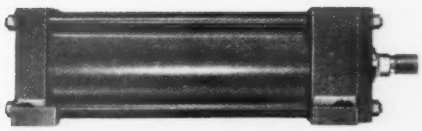
HYDRAULIC STRAINER UNIT

Device labeled the Telltale Strainer notifies the user when the hydraulic strainer is dirt clogged, acts as a



by-pass valve, provides for easy strainer removal and hikes the usable oil supply. A red signal notifies the operator when the strainer is clogged and has been pulled aside by pump suction to allow the free flow of oil around it. Automated setups can use an optional limit switch for a remote signal light. Strainer is re-





Five cylinder series... each the best of its kind!

Here you see one more reason why experienced cylinder users prefer Hannifin cylinders...there is a Hannifin cylinder series for every type of service.

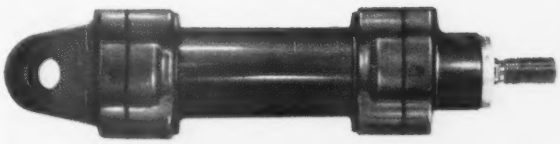
What pictures cannot show you is the extra effort that goes into every Hannifin cylinder, all the way from the drawing board to the shipping dock. This brings you design features other cylinders simply do not have...superior workmanship where it's most needed for long, trouble-free service...and better delivery promises, better kept. All at prices no higher than you may have been paying for less satisfactory cylinders.

There's a Hannifin man near you—or, if the need is urgent, call us long distance. He or we will welcome the opportunity to help you as you select the Hannifin cylinder series that best meets your needs.

AIR AND HYDRAULIC

HANNIFIN

POWER CYLINDERS



COMPLETE CYLINDER FILE

Write for your copy of this new Hannifin Cylinder File...complete, easy-to-use, easy-to-order-from information on five lines of Hannifin cylinders. Write Hannifin Corporation, 637 S. Wolf Road, Des Plaines, Illinois.

There's a big difference in sands . . .

Ask your Nugent sand-man to show you how Nugent core sand is naturally better!

Put samples of Nugent sand to the test in your sand lab — you'll *see* why it's naturally better! Nugent sand is processed from the best Muskegon dune sand, washed pure by nature for centuries . . . kiln-dried to the correct moisture content, then graded to a uniform AFS grain analysis. This means less core breakage, consistently uniform molds, greater pattern definition and finish, plus freedom from defect-producing components.

5 GRADES OF CERTIFIED SAND

A constant AFS grain analysis of 40, 44, 49, 52 and 55 is maintained through continuous testing with up-to-date laboratory methods. Exacting control processes result in uniform green strength, permeability, moisture, grain distribution, and other characteristics. You get *known* sand quality and unsurpassed uniformity from a source preferred by foundrymen for over 40 years. **Plus-Shell process sands.**

See your Nugent sand-man or write direct for proper core sand recommendations. Samples on request.

Represented by —

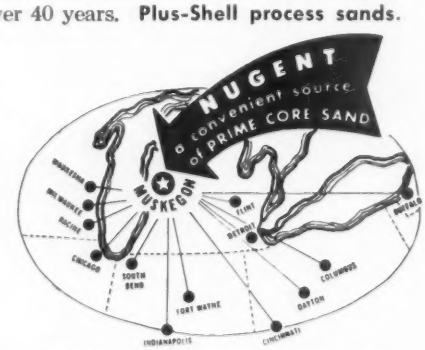
INDIANA PRODUCTS CO.
Kokomo, Indiana

WARNER R. THOMPSON CO.
Detroit 8, Michigan

CARPENTER BROTHERS, INC.
Milwaukee 3, Wisconsin

KEENER SAND & CLAY CO.
Columbus 15, Ohio

GREAT LAKES FOUNDRY SAND CO.
Detroit 26, Michigan



Thanks to Nugent's convenient location, you can count on prompt shipments of sand by 3 main railroads or truck when you need it.

1912 1954
CANNON
CORE SAND

Nugent is always ready to serve you with graded sands for the foundry.

THE NUGENT SAND CO., INC.
MUSKEGON, MICHIGAN

moved easily as it is held in place only by the bolted-on end plate. Made by **Rosaen Co.**, 1776 East Nine Mile Rd., Hazel Park, Mich.

For More Details Circle No. 463—Page 326

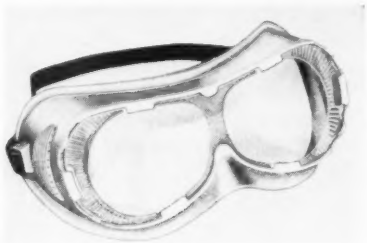
TROUGHING CONVEYOR

Hingeless metal troughing conveyor can be used for moving sand, castings, scrap, chips, grain, chemicals, powder and other materials. Length, width and shape are adapted to suit applications. Conveyors are available for portable and stationary use with load rolling on rolls. Minimum height from floor is 14 in. Made by **R. T. Sheehan Co.**, Box 345, Plymouth, Mich.

For More Details Circle No. 464—Page 326

UTILITY GOGGLES

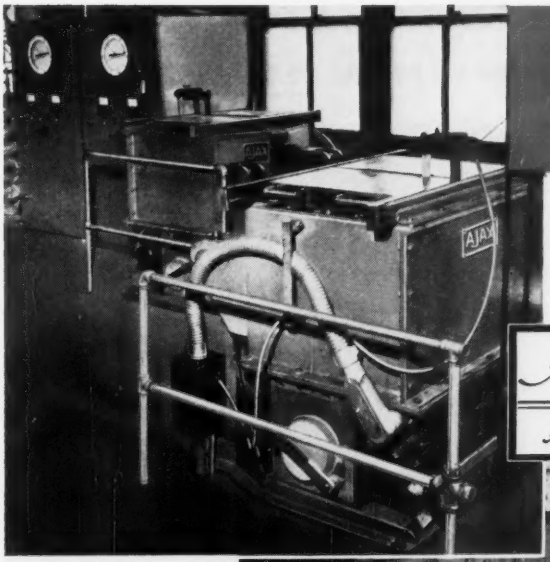
Lightweight, utility goggles feature a large-size polyethylene frame that fits over the largest prescription glasses. Louvered side and front insure ample ventilation but prevent entry of flying particles. Lens is made of shatterproof, impact-resisting plastic and snaps securely in place without use of rivets or fasteners. Made by **American Industrial Safety Equipment Co., Dept. V-5,** 3500 Lakeside Ave., Cleveland 14, O.



For More Details Circle No. 465—Page 326

FILE GRIP HANDLES

Lightweight aluminum grip handles convert ordinary files into convenient cutting tools for use like a plane. Handles are made in two sizes to fit any size or make of mechanic's file. Files can be attached and removed with a gentle tap. Filing operation



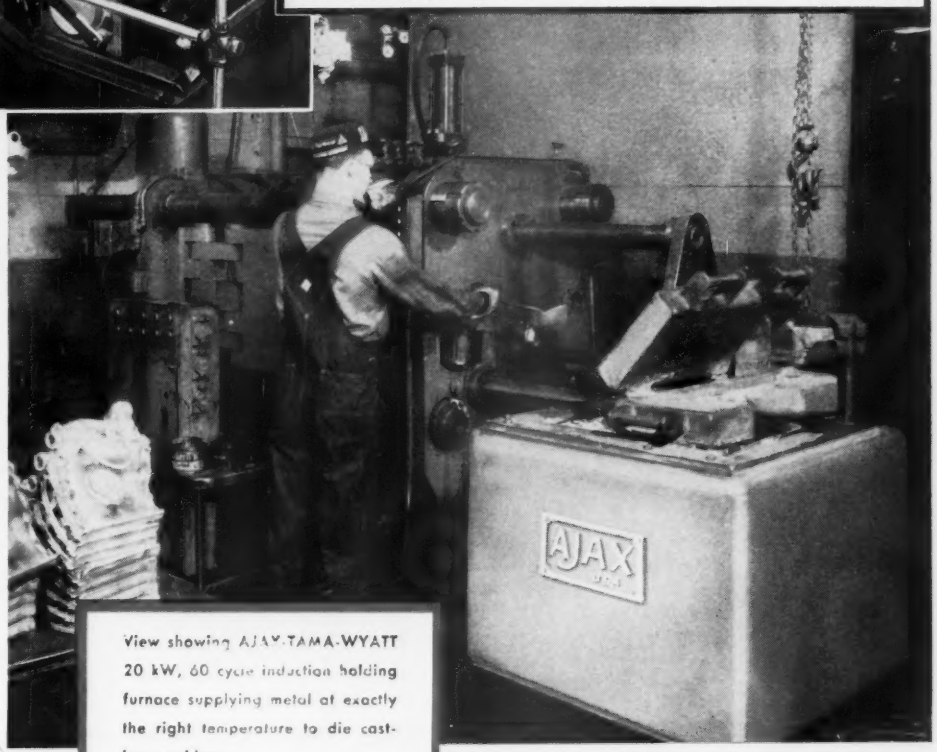
AJAX INDUCTION FURNACES

mean Higher Quality Castings for...

Advance
TOOL & DIE CASTING COMPANY

Aluminum DIE CASTINGS *Zinc Base*

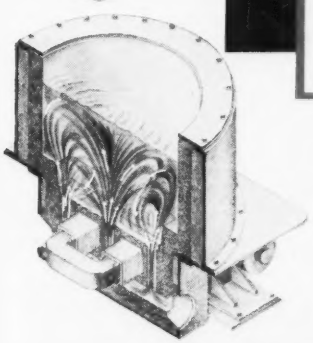
View above shows AJAX melting furnaces, with control cabinets in background.



View showing AJAX-TAMA-WYATT 20 kW, 60 cycle induction holding furnace supplying metal at exactly the right temperature to die casting machines.

The Furnace That Stirs Itself...

The sectional view below shows the twin-coil stirring action of the 100 kW, 60 cycle AJAX Induction Furnace. Heat induced in the secondary channels below is conveyed throughout the melt by electro-magnetic circulation, as shown by the arrows.



Inherent stirring action of these furnaces has proved most valuable to ADVANCE TOOL & DIE CASTING CO., Milwaukee, Wisc. In full operation for four years, the most important result of the use of these furnaces is higher quality die cast aluminum parts. The alloy is held in uniform solution, resulting in elimination of oxides, reducing hard spot trouble in secondary machining to a negligible factor. Temperature of the melt is held at 1170° F. through on-off control of the low power circuit. Working conditions are made more comfortable because of low heat losses. The units take up very little floor space.

AJAX

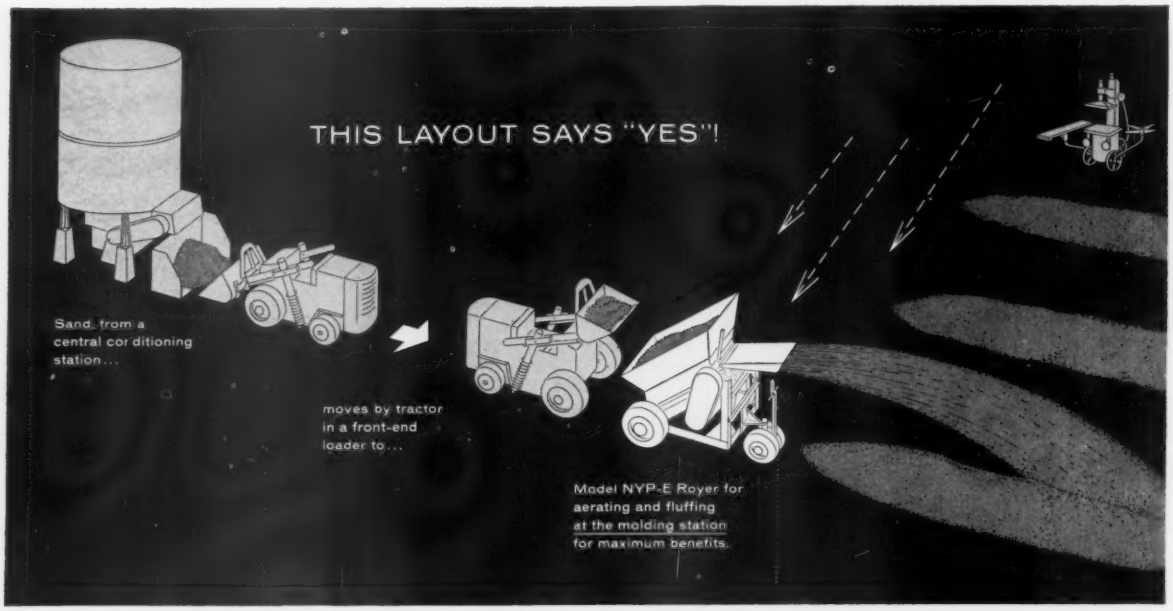
LINE FREQUENCY
INDUCTION MELTING FURNACES

AJAX ENGINEERING CORP.
TRENTON 7, NEW JERSEY

Associated Companies
Ajax Electric Company — Ajax Electrothermic Corp.

Circle 756 on Inquiry Card—Page 51

ASK YOURSELF . . . "CAN WE GET BETTER SAND, AND A BETTER SYSTEM, WITH A ROYER?"


THIS LAYOUT SAYS "YES"!
Sand, from a central conditioning station...
moves by tractor in a front-end loader to...
Model NYP-E Royer for aerating and fluffing at the molding station for maximum benefits.

HERE'S HELP FOR YOU
Bulletin NY-54 for complete details and "specs" . . . an experienced Royer engineer to help you work out the system. Either or both for the asking.

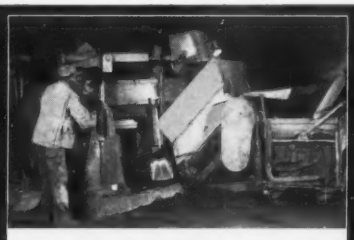
Here is a positive cost-cutting sand conditioning system that falls within the budget limitations of the small or medium semi-mechanized foundry. It delivers better sand without adding to time or manpower requirements, and without the expense of complete mechanization. It gains the advantages of fluffing *after* handling, as the final step at the molding station.

An integral part of this practical system is the Royer Model NYP-E Sand Separator and Blender. It can be moved swiftly from station to station, delivering cooled, aerated, fluffed, perfectly conditioned sand right where it's wanted. With it you can *really* get all the advantages of central system sand control.

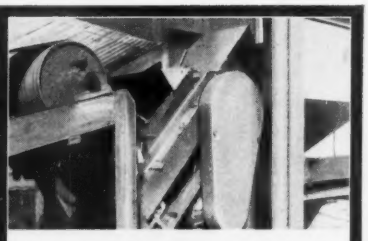
Maybe your system "is different." There's a versatile unit of the Royer "NY" Series to fit it . . . and *improve* it. As the photos show, there are stationary models for easy installation at the discharge of a muller or in conveyor systems. But, however you use it, the Royer vastly improves sand, saves time and money, improves yield and quality of castings—all at a *fraction of a cent per ton of sand.*

Note the special literature offer. Write, wire or phone today.

Teamed with front-end loader, a Royer NYP-E Portable moves from floor to floor in a grey iron foundry. What used to be caked, packed sand from mulling, now is a cool, fluffy pile.



"NY" Stationary in a different role—taking direct 1800 lb. discharge of stiff sand from a 9 ft. muller in a steel foundry.

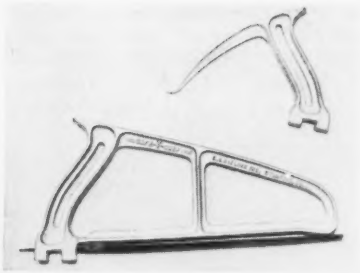


Foundrymen insert versatile "NY" machines into conveyor systems wherever convenient. Result—perfect sand . . . no time hold-up.

Foundry-wise agents throughout the U. S.
EXPORT DEPT.
10406 South Western Ave.
Chicago 43, Ill.
IN CANADA
Brown Engineering Corp.
15 Alcorn Ave., Toronto, Ont.

ROYER

ROYER FOUNDRY & MACHINE CO.
159 PRINGLE STREET / KINGSTON, PENNA.
FOREMOST IN SAND CONDITIONING EQUIPMENT



reportedly is speeded because the handles permit use of the entire file from tip to tang. Grips have vented handles for one or two-handed operation, positioned to provide uniform working pressure to save file wear and prevent uneven work. Made by **E. V. Nielsen Inc.**, 129 Broad St., Stamford, Conn.

For More Details Circle No. 466—Page 326

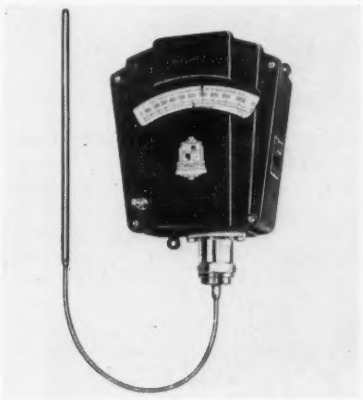
WELDING ELECTRODE

Mild steel arc electrode with an iron powder coating can be used for repairing steel castings as well as for other welding fabrication operations. The electrode, designated the Strikeasy 610, is believed to be the first in the E6010 class with iron powder coating. The addition of iron powder has resulted in improved weld quality because of the reduction in size of the "wagon tracks" usually formed in mild steel welding, according to the manufacturer. Made by **General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 467—Page 326

THERMAL CONTROL

High-temperature limit control cuts off the heat supply if a predetermined temperature, set on the cali-



brated scale, is exceeded. It protects against loss or damage to equipment or work which might result from overheating. Bulb temperature is indicated on the calibrated scale at all times to provide check on process temperature as well as give visual proof that the control is in operating condition. Scale and element ranges available are 0 to 900 and 0 to 1100°F, respectively. Made by **Partlow Corp.**, New Hartford, N. Y.

For More Details Circle No. 468—Page 326

SALT TABLETS

Impregnated and enteric salt tablets are dispensed in high-impact styrene plastic expendable throwaway dispensers. Dispensers contain 500 or 1000 tablets and can be mounted to posts, wall, water keg, vehicle or other accessible locations. Dispensers are factory sealed for sanitary reasons. Tablets are 10-grain size and swallowed whole with drink of water. Made by **United States Safety Service Co.**, 1215 McGee St., Kansas City 6, Mo.

For More Details Circle No. 469—Page 326

SUBZERO CHILLING UNIT

Low-temperature chilling machine of subzero quenching and chilling applications features a 47-cu-ft cham-

You'll find abrasives by Cleveland!

Foundries, metal-working plants; wherever you find peening or blast cleaning, you'll find shot and grit manufactured by the Cleveland Metal Abrasive Company.

Only Cleveland Metal Abrasive Company produces REALSTEEL* cast steel shot and grit. Your assurance of consistently high quality and uniformity at the lowest possible cost.

Impact cleaning . . . preparing surfaces for finishing . . . removing scale . . . or for any other cleaning or peening problem, Cleveland Metal Abrasive Company has the right shot or grit for you.

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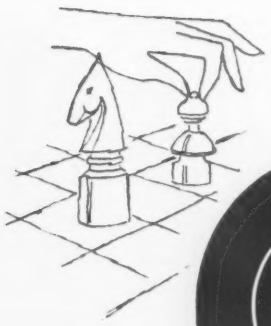
Toledo Steel Shot Division: Toledo, Ohio

One of the world's largest producers of quality shot and grit—Hard Iron—Malleable (Normalized*)—Cut Wire—Cast Steel (Realsteel*)
*Copyrighted trade name

Circle 758 on Inquiry Card—Page 51

Coles full circle slewing cantilever boom makes "free cube" storage a paying proposition



Coles works closer to stacks for accurate spotting, maximum SELECTIVITY

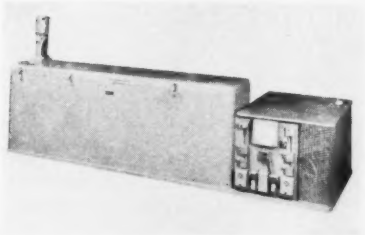
COLES CRANES
JOLIET 3, ILLINOIS

WRITE FOR BOOKLET "101 Cost-Cutting Ways"

Photo courtesy of International Harvester Company's Tractor Works - Chicago, Illinois

Now, available L.P.G.- diesel- or gasoline-electric powered in capacities from 2 to 15 tons. Available on long term lease arrangement, too.

ber, has a thermal capacity of about 6000 Btu per hr at 120°F and can chill 250 lb of steel per hour from +80° to −120°F. The chilling chamber area is 18 in. wide x 36 in.

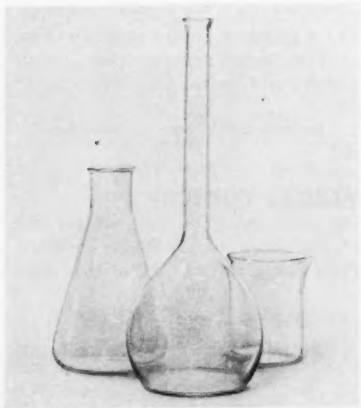


deep x 120 in. long, is welded pressure-tight and constructed of 7-gage steel. Compressors are belt-driven by two 5 hp motors. The unit operates on 440 v, 60 cycle, 3 phase current. Made by **Cincinnati Sub-Zero Products,** 3930 Reading Rd., Cincinnati 29, O.

For More Details Circle No. 470—Page 326

LABORATORY GLASSWARE

Improved line of West German laboratory glassware is being imported to this country for distribution through laboratory supply houses to industrial, clinical and edu-



cational laboratories. Both Jena glassware and Haldenwanger porcelainware products are being imported and both lines were used widely in the United States in former years, according to the importing company. The importing company is **Kern Laboratory Supply Co.,** Dept. M-9, 8639 Venice Blvd., Los Angeles 34, Calif.

For More Details Circle No. 471—Page 326

FIXTURE REST BUTTONS

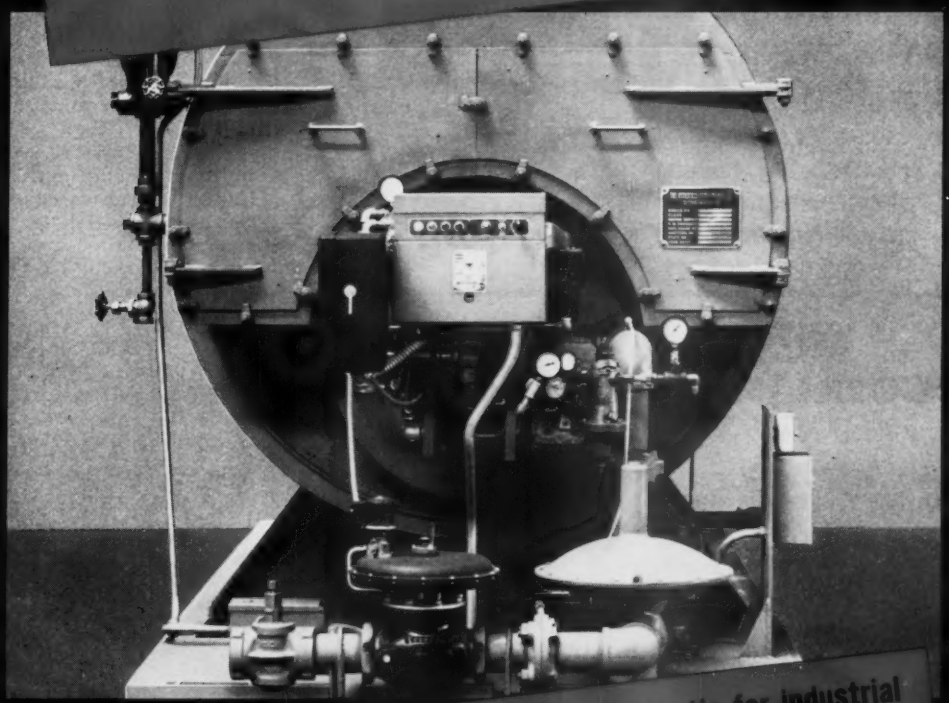
Alloy steel rest buttons are offered in two types and a range of sizes for jig and fixture applications. The buttons are hardened to Rockwell 58-60 and ground after hardening. They

NORTH AMERICAN series 117

Flame King BURNER

a packaged burner unit for

GAS, OIL OR DUAL-FUEL



completely safe and automatic for industrial or commercial heating and for boilers developing 90 to 260 horsepower

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PHONE: WORTH 1-3758
STOP AT BOOTH NO. 301 IN CINCINNATI

Circle 762 on Inquiry Card—Page 51

TERRE HAUTE
SPECIAL FOUNDRY COKE

"...as you want it!"

- Only premium grades of coking coals go into it—the best the market affords
- Full care to highest possible fixed carbon and shatter resistance. Low ash. Proper density and uniform cell structure.
- Result? You choose wisely and permanently when you specify Terre Haute special foundry coke.

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Branches: Peoria • St. Louis • Indianapolis
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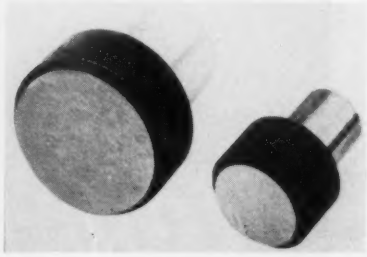
Manufactured by: INDIANA GAS & CHEMICAL CORP
Terre Haute, Indiana

Circle 763 on Inquiry Card—Page 51

are used as cutter set gage blocks and as locating parts in jigs and fixtures. Buttons with shanks are made in 16 sizes with ample stock on the shank for final fitting. Jig



rest buttons may be ordered with drilled and C-bored hole for socket head screw in 18 sizes. Made by **Jergens Tool Specialty Co.**, 712 East 163rd St., Cleveland 10, O.

For More Details Circle No. 472—Page 326

DRY CHEMICAL ENGINES

Dry chemical engines of 75 and 150-lb capacities provide high capacity and mobility to combat big flammable-liquid blazes. The wheeled engines are pressurized by nitrogen to expel smothering dry chemical powder through an adjustable nozzle which can be set for long range

or "fan" stream. The 150-lb model gives protection for 80 sq ft of flammable-liquid hazards such as open dip tanks, quench tanks and solvent vats. Made by **Fyr-Fyter Co.**, Dayton, O.

For More Details Circle No. 473—Page 326

ENGINE-DRIVEN WELDER

Gasoline-engine-driven welders are equipped with 12.9-hp engines. Model AEA-200-L produces 225 amps of continuous-rated, high-cycle welding current or 5 kw of 110-220 ac power for operation of power tools or lights. One kw of 110 v, dc power is available while welding. Model AEA-200

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Swim suit by Jantzen

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The finest malleable shot and grit on the market

METAL BLAST, INC.

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MELTING POTS
INGOT MOLDS

Designed by
FOUNDRYMEN...
for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.

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does not offer the 110-220 power feature. Both may be equipped with Redi-pull starter. Optional equipment includes rubber-tired hand run-

ning gear or road towing trailer. Made by **Miller Electric Mfg. Co.**, Appleton, Wis.

For More Details Circle No. 474—Page 326

HYDRAULIC VALVES

Designed for the die casting industry, a 3000 psi, semiautomatic, four-way hydraulic valve provides leakfree operation with water, glycol or oil-base hydraulic fluids. The valve will not reverse itself in case of air or electrical supply failure. The E-440-X series is offered in 1, 1½ and 2 in. NPT sizes for line pressures up to 3000 psi. Made by **Sinclair-Collins Valve Co.**, 454 Morgan Ave., Akron 11, O.

For More Details Circle No. 475—Page 326

POWER HAND TOOL

Hi-Torque Handee, Series 6000, power hand tool weighs 14 oz and operates at 25,000 rpm for grinding, cutting, drilling, sanding, sawing, engraving, polishing, cleaning and burnishing. The tool works in wood,

hardened steel, nonferrous metals, ceramics and plastics. The tool is available for operation at 110 or 220 v, 25 to 60 cycles, ac or dc, and has a complete set of all-purpose accessories. Made by **Chicago Wheel & Mfg. Co.**, 1101 West Monroe St., Chicago 7, Ill.

For More Details Circle No. 476—Page 326

WHEELABRATOR®
STEEL SHOT
cuts abrasive costs
for **ALL TYPES**
of foundries

foundry producing malleable and steel castings saves $32,165 a year in abrasive costs

Two years ago, a leading midwestern malleable and steel foundry switched to Wheelabrator Steel Shot in its Wheelabrator blast cleaning equipment — and now saves $128.65 a day in shot costs alone.

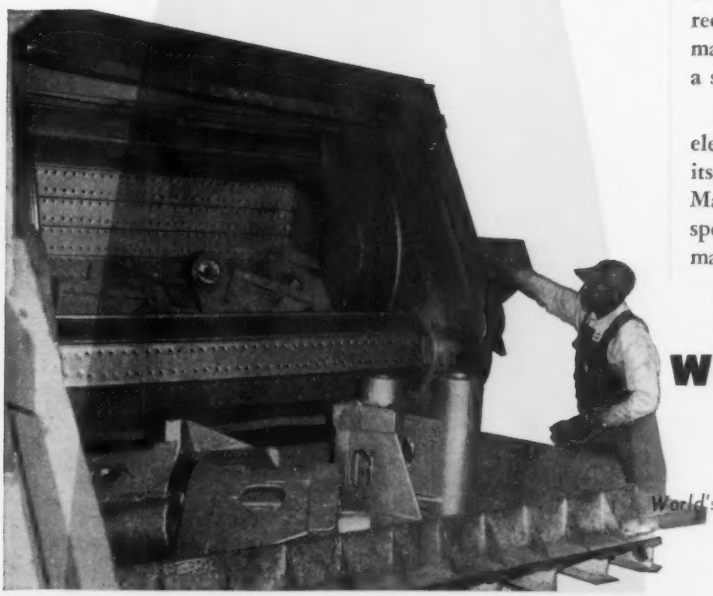
Wheelabrator Steel Shot makes these savings while operating under a wide variety of conditions.

It is used in four different sizes of airless blast cleaning machines. It cleans steel castings ranging from 1½ lbs. to 1,800 lbs. in weight and cleans malleable castings from ½ lb. to 180 lbs. Castings vary in size from 3″ x 3″ x 12″ to 2′ x 3′ x 3′. Sand conditions range from medium to heavy and steel castings are blasted before and after heat treating.

Cleaning an average of 140 tons of steel castings and 75 tons of malleable castings every day, this progressive foundry has reduced annual abrasive costs from approximately $68,000 a year to only $35,000 — a saving of more than $32,000 a year.

Start using this superior heat treated, electric arc furnace steel shot that has proved itself under all types of conditions. Make savings in abrasive costs, speed cleaning and reduce maintenance expense.

For more information, send today for Catalog 89-B.



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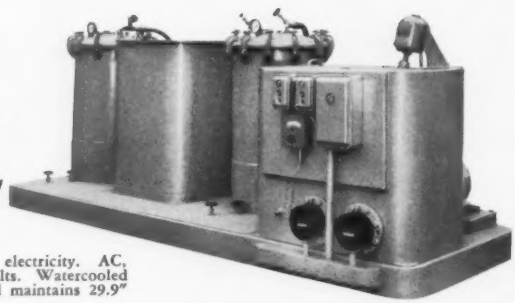
World's Largest Manufacturer of Steel Shot and Airless Blast Cleaning Equipment

PRODUCTION IMPREGNATION DRASTICALLY CUTS TEST COSTS

with the NEW IMPREX "TWIN 60"



Heated by gas, steam or electricity. AC, DC, 115, 230, 450, 560 volts. Watercooled Vacuum Pump reaches and maintains 29.9" of mercury vacuum.

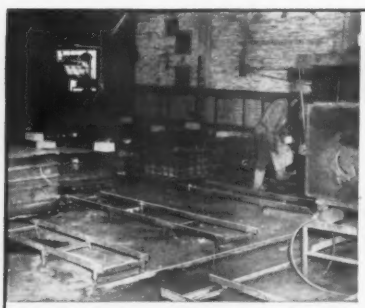
Production line impregnation of *all* your pressure castings eliminates the costly 100% testing of selective impregnation. Designed for speedy production techniques, the dual autoclave IMPREX "Twin 60" assures complete penetration of sand or die castings of any metal — with coarse or micro-porosity. Advanced engineering of the IMPREX "Twin 60" assures you pressure tight castings, speeds your production, cuts your costs — ***increases your profits.***

For complete facts and technical data on how **you** *can do production impregnation write to:*

IMPREX DIVISION 2023-c SOUTH 60th • MILWAUKEE 19, WISCONSIN

IDEAL INDUSTRIES, INC., SYCAMORE, ILL.

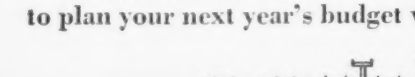
Circle 770 on Inquiry Card—Page 51



MODERNIZATION of Your Foundry COSTS LESS Than You Think!

The new, streamlined Nomad Conveyor System eliminates the old-fashioned "running out" of molds. Instead, your molds are set on a pallet or roller-equipped bottom board, "rolled away" down the conveyor line and poured. It is all done smoothly and quickly, without shifts in the mold, without strain or even an aching back. You get a compact, space-saving layout, low-cost modernization and efficient, profit-making production.

Write for information that will enable you to plan your next year's budget wisely.



WESTOVER CORPORATION
NOMAD EQUIPMENT DIVISION
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

NOMAD FOUNDRY EQUIPMENT

Laws About Liability for Compensation Are Varied

Keep Careful Records and Make Physical Checkups

By Albert W. Gray

ALTHOUGH no just criticism can be made of the underlying purpose of the Workmen's Compensation Acts, the rules of law governing the imposition of the liability are in many instances confusing and uncertain.

When an injured workman has been the victim of an accident occurring "in the course of" and "out of" his employment, the liability for the award under these laws rests on his employer. When, however, the condition from which the employee became ultimately disabled occurred in the course of employment under successive employers, the simplicity in the imposition of this liability disappears.

Recently a molder employed by a Rhode Island foundry became disabled by silicosis and died. This disease had been contracted 11 years before, and during those years he had been employed in the same type of work by four different foundries.

The employer appealed the award and sought a reversal on the ground that it did not appear that this employee had contracted the disease while in the employ of this foundry.

"An occupational disease by nature," said the court here, "is usually a gradual growth over a long period of exposure to diverse conditions. Ordinarily it is not disabling at the time of its origin or contraction and the victim becomes aware of it so as to take advantage of the statute only when the disease becomes incapacitating."

Referring to the application of this employer for a reversal of the award the court continued, "The employee is allowed to sue the last employer for whom he was working when be became incapacitated from the disease, reserving to such employer the right to a proportionate contribution from previous employers in whose employ the employee may have contracted or been exposed to the disease which finally caused his disability."

Although the basic principle of this law is common to these statutes throughout the country, different methods for thus apportioning the compensation to be paid have been adopted.

Only a few months before this Rhode Island decision, in a case of this character before a court in Minnesota, an employee had been af-

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in 3 seconds
by the magic of the
CO_2 PROCESS
using STEINEX*

STEINEX

*STEINEX, the original CO_2 Sand Binder, is the standard of *quality and comparison* throughout the world. Hardens fast, produces harder cores, less gas evolution and better shake-out. No other binder can compare with it in quality. Made in seven grades to meet the customers specific requirements.

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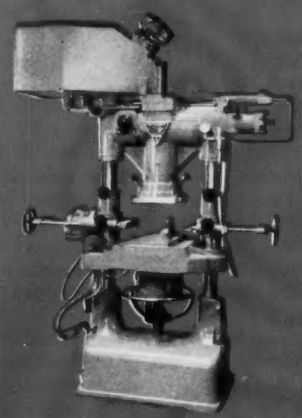
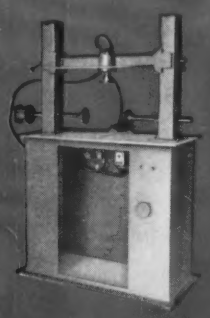
Complete Suppliers for the CO_2 PROCESS

Everything you need for the CO_2 PROCESS



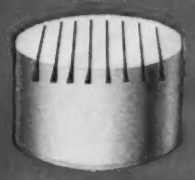
V + S
CORE SHOOTER



CARVER AUTOMATIC
GASSING APPARATUS

FORMLAC CORE and MOLD WASH
puts a hard coat on CO_2 cores that tremendously improves handleability. High refractory properties assure against burn-in on any size casting. Wonderful to stiffen up long, delicate or thin cores.

V + S RAPID
SAND MIXER

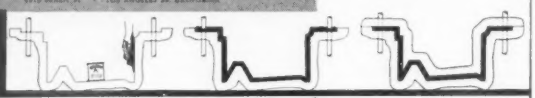


Self-Cleaning, Taper-Slot
CORE VENTS

A TECHNIQUE FOR PLASTIC PATTERNS

Furane Plastics, Incorporated, working with plastic pattern shops, has developed a technique for duplicating existing pattern equipment that is creating a great deal of interest in the industry. We invite you to write for this completely illustrated brochure which gives a comprehensive, step by step account of the duplicating process.

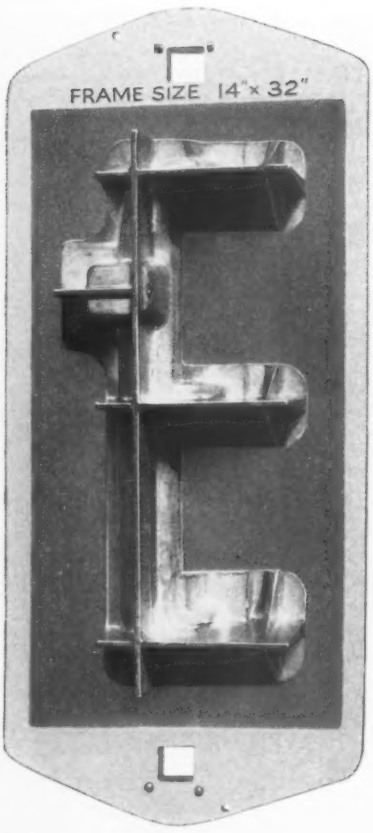
TYPICAL ILLUSTRATIONS



4516 BRAZIL ST. • LOS ANGELES 39, CALIF.

furane plastics
Incorporated

Circle 773 on Inquiry Card—Page 51



"The type of work we produce in TAMASTONE we would be unable to make at all in the absence of skilled help"

COLUMBUS BRASS & ALUMINUM CO., INC.
Columbus, Indiana

The Drier pattern at left is for air intake diesel manifold made from an original master pattern. *Only one skrinkage!* Material is aluminum. Pattern was used for 50 Driers. Only 3 hours labor and 35 pounds of TAMASTONE were required. Up to 1,000 castings have been made from a plate of this type!

No special skill needed to increase production 400% or more! . . . WRITE . . .

TAMMS INDUSTRIES, INC.
228 N. LaSalle Street
Chicago 1, Illinois

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flicted with this disease for 70 weeks, half of the period while in the employ of one company and the other half in that of a foundry.

It was held by the Minnesota court that whereas in this instance the employee's disability was in part the result of an accident sustained under a new employer and in part the result of an accident sustained under a former employer, such liability may be apportioned.

In another instance of this character a victim of silicosis had contracted the disease some time during 20½ years of work in various mines and tunnels.

In the imposition of liability the California court said of the apportionment of this compensation, "An employer upon whom the facts and the law place responsibility for silicosis who would escape a portion of the load on the theory that he alone is not responsible, necessarily has the burden of proving that other employers should share the responsibility. Where it is made to appear that an employment had brought about a case of silicosis which was aggravated by a subsequent employment, the burden of compensating the employee for the resulting disability is properly divided among the employers upon whom liability exists."

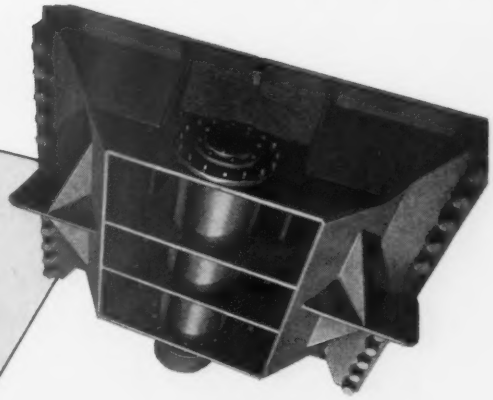
While in theory such a method of allocating the responsibility would seem just, in New York state recently a still more perplexing decision was made by a court of that state. An individual killed in an airplane crash while on a business mission was in the employ of two Rhode Island manufacturers and a New York firm.

Claim for death benefits was filed against the New York employer. Among other defenses this employer contended that any award against it should be reduced by dividing the total award by the number of employers. The New York court held of this defense that it had no basis either in reason or authority.

"An employee who is injured while simultaneously engaged in the service of two employers may look to the one or to the other or to both for compensation for injuries due to occupational hazards. The amount of the award against the employer who is brought before the Board may not be cut down merely because the claimant had been simultaneously in the service of other employers as well.

"Even if the other employers were subject to the New York Compensation Act and were properly brought into the proceedings it would still rest in the discretion of the Board whether to make a joint award against all the employers or to make

it's the
EXTRA WEIGHT
that
Slashes Knockout Time



"FOUNDROMATIC" SHAKEOUT

This view of the *Foundromatic* shakeout from below shows what we mean by heavy duty construction. Look at the sturdy deck supports and heavy tubular steel spacer, all welded integral with body and deck. Construction like this, of course, adds years to shakeout life, but more than that—it *provides the reserve weight* that assures rapid knockout of cores and shakeout of flasks. The *Foundromatic* shakeout weighs more than 40% of its rated capacity — and that's all the weight you'll ever need for a fast, clean operation.

For complete information, see your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin O7B6365B.

New Control Replaces Mechanical Snubbers... Assures Smooth Stop

Single control features two timers. When "stop" button is pressed, the first timer allows shakeout to coast down to one-third operating speed. This timer then energizes contactor which reverses current. This reversal of current through motor carries shakeout quickly through critical amplitude range. Stopping is smooth. Second timer shuts off current before motor can reverse direction of rotation. See Bulletin O7B8141.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5409

Doing SHELL MOLDING? If so, you can now do it ECONOMICALLY!

- Amazing results easily obtained for shell molding.
- Quick blending of sand for conventional cores and molds.
- No other equipment will blend as fast or effectively.
- Only true mechanical duplication of mortar and pestle method of blending.

A Sancote Muller will give you increased production plus better castings. In addition, you will save up to 50% or more on resin costs.

Never before in foundry history has a new process received such rapid and wide acceptance as shell molding. Sancote Muller eliminates dust and health hazards in handling of phenolic resins and solvents

The Sancote Muller will coat sand automatically. Built-in ruggedly constructed anti-friction bearings throughout. It is built in three sizes with capacities from 100 to 1000 pounds.

While the Sancote Muller was specifically designed for the cold coating of sand with phenolic resin, it has worked wonders in the blending of silica sand with bentonite. It is not only a mixer but also a muller in the true sense of the word.

Send today for your copy of our new brochure showing full particulars.

Sancote

MULLER

SHALLWAY MULLER CORP.

CAMBRIDGE, NEW YORK

an award against one or more of them.

"Furthermore, even if there were a joint award against all the employers, the award could be collected from any one of them subject to a possible right on the part of the one paying the award to obtain contribution from the others. Consequently, the claimant is entitled to recover in full in this case from the only employer who was subject to the jurisdiction of the New York Workmen's Compensation Board."

The answer to the problem suggested by these and similar cases lies with the lawmakers of the different states, but maintenance of personnel records of previous employment and careful physical checkups for incipient occupational diseases may render valuable service to employers.

Hoist Manufacturers Change Name and Elect New Officers

Arland R. Walkley, general manager, Manning, Maxwell & Moore Inc., Muskegon, Mich., recently was elected president of the newly organized Hoist Manufacturers Association Inc., successor to the Electric Hoist Manufacturers Association. The group will initiate, continue and expand a series of programs among which are safety, simplification and statistics.

Milton L. Aitken, general sales manager, Robbins & Myers Inc., Springfield, O., was named vice president and Joe H. Peritz was elected executive secretary and treasurer. Offices are located at One Thomas Circle, Washington, D. C.

Directors are Carol O. Hedner, assistant general sales manager, Yale & Towne Mfg. Co., Philadelphia; William C. Miles, vice president, American Enginering Co., Philadelphia and William S. Armington, sales manager, Euclid Crane & Hoist Co., Cleveland.

HELSPOT

Slag Resisting Monolithic Lining for Metallurgical Ladles and Furnaces

HELSPOT—"tried and proven" super quality plastic firebrick—will reduce ladle lining costs, improve pouring operations and minimize metal contamination. Highly refractory graphite, chemically sealed into the mix, gives HELSPOT lining a smooth, 'self-lubricated" surface which permits easy metal flow and prohibits metal penetration. The formation of skulls is practically eliminated in HELSPOT-lined ladles. Slags do not build up on the slick graphite surface; less time is required for cleaning, repairing or relining ladles.

A Super-Duty Fire Clay base assures maximum resistance to spalling and cracking. HELSPOT lining will withstand the most severe thermal shock. HELSPOT comes, ready to install, in 100-lb. cartons and 500-lb. drums.

127

HELSPOT
LADLE WASH
A finely ground material with a graphite base, recommended as a final coat for any ladle lining. It seals drying-in cracks, replaces surface loss through oxidation, produces a smooth, even lining surface. In 100-lb. bags, add only water, mix; easily applied with brush.

MEXICO REFRACTORIES COMPANY
MEXICO, MISSOURI
NILES FIRE BRICK DIV.—Niles, Ohio ● NATIONAL REFRACTORIES DIV.—Philadelphia, Pa. ● BIG SAVAGE REFRACTORIES DIV.—Frostburg, Md.
Canadian Affiliate: REFRACTORIES ENGINEERING & SUPPLIES, LTD.—Hamilton, Ontario, Canada

Angle-cock cores shown in the foreground were blown in box held by the coremaker

Cohesiveness of dextrose binder resists core sag. With a standard release agent, stripping is easy

CASTING QUALITY
Enhanced by
GOOD CORE PROPERTIES

By R. W. CARPENTER
Foundry Metallurgist
Watertown Division
New York Air Brake Co.
Watertown, N. Y.

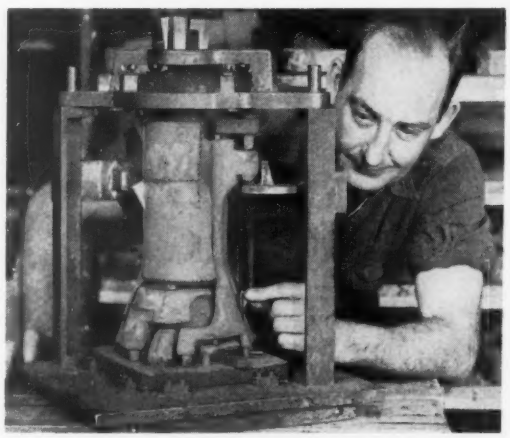
PRODUCTS of the New York Air Brake Co. must meet exacting performance requirements. Castings for these products, made at the Watertown, N. Y., foundry, are for hydraulic pumps and motors of the company's Kalamazoo Div., for the liquid handling and high-vacuum pumps of the Kinney Mfg. Div., for railroad air brake equipment, and for hydraulic pumps and motors of the Watertown Div.

Because all of these castings must be made to close precision, we always must be alert to new processes or materials which offer the possibility of raising the quality of our output.

Late in 1955, the foundry began experiments with a new dry core binder. In form, this binder is a white, water-soluble powder composed of more than 90 per cent dextrose, or corn sugar. The remainder consists of a catalyst—ammonium sulfate—which effects progressive polymerization of the dextrose during baking of the cores.

Mulling and Baking Fast—Several important benefits from use of the new binder became apparent almost at once. Mulling time is short and provides good dispersion. Baking is fast. Very little cracking of cores, which could result in metal penetration, is encountered. Absence of veining and finning provides smooth interval passages which do not require excessive grinding and finishing. The prime benefit was the improvement in the quality of our castings.

In the last year, because of these and other reasons, this foundry grad-



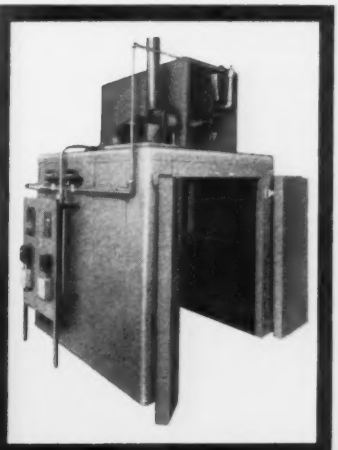
Pasting frame contains core assembly for deadman control component

Foundry Products and Production Rates Dictate Oven Requirements

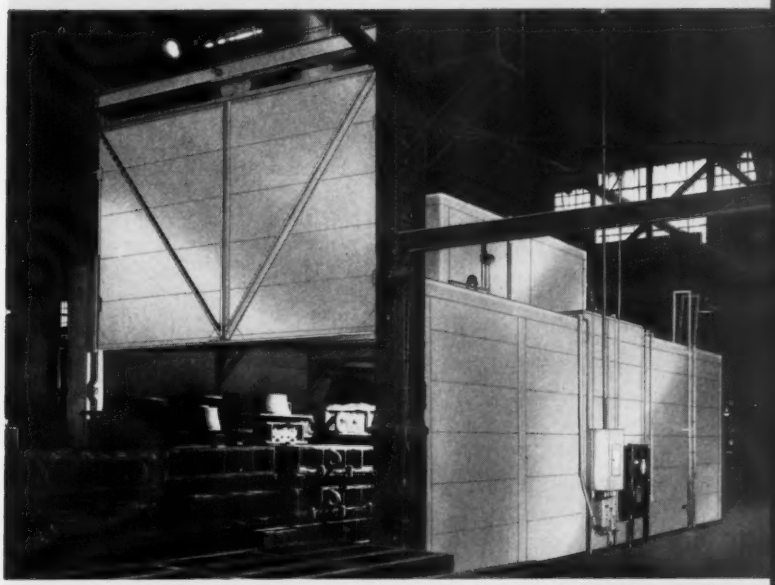
LANLY *can meet any and all of yours*

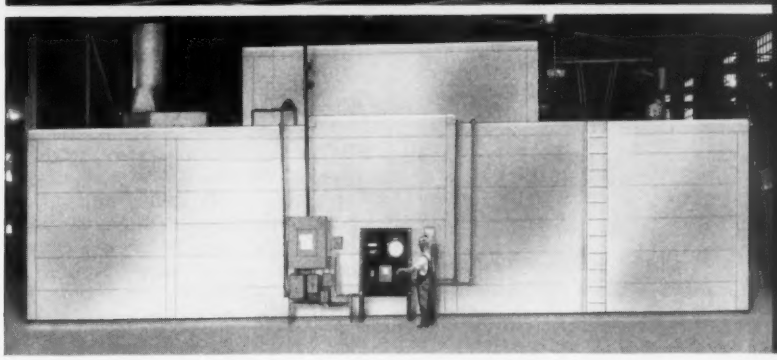
- from Small RACK TYPE OVENS

generally used when the baking of smaller cores is required in the production operation of your foundry.



-to Gigantic CAR TYPE OVENS





when the drying of large molds and cores for bigger castings is required.

This huge installation in the foundry of a large supplier of railroad products efficiently and economically carries its share of the load in the production of better castings.

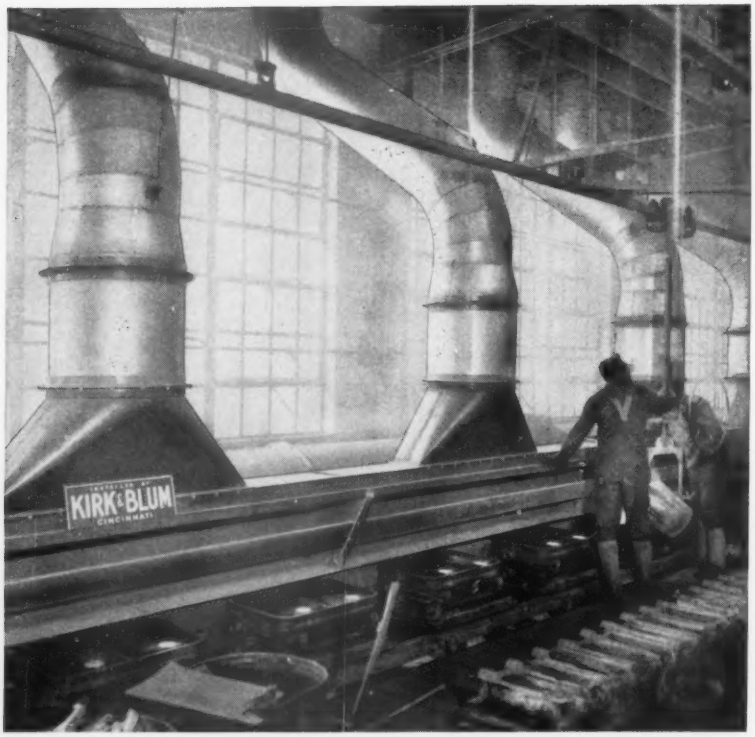
Consult LANLY for a proposal on foundry ovens before you buy. A check of your present equipment may disclose a fuel eater, a core spoiler or a heat loser amongst them.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

THE Lanly CO.

FOUNDRY OVENS

780 Prospect Ave. • Cleveland, Ohio



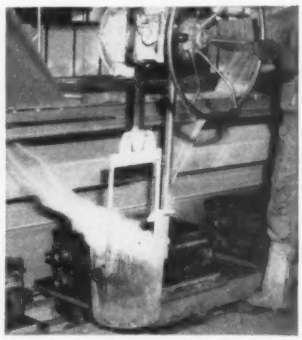
Fumes

40 ft. KIRK & BLUM hood removes fumes as they are formed at any point on "moving floor" pouring station.

DON'T SLOW
FAST-MOVING PRODUCTION
at The William Powell Co.

Illustrating KIRK & BLUM's complete service . . . design, fabrication and installation . . . are six dust and fume control systems at The William Powell Co., noted valve manufacturers. From sand handling to casting grinding, these K & B systems provide the clean air so essential to efficient operations.

Whether your foundry melts a few or many tons per day, you can use "The Invisible Tool . . . Clean Air." For a survey of your needs, or for further details, write: The Kirk & Blum Mfg. Co., 3239 Forrer St., Cincinnati 9, Ohio.



At pouring station, fumes travel only few inches to "lateral cross draft hood"—are exhausted below operators' breathing level.

KIRK & BLUM

ually has expanded its use of the dextrose binder. Today we are using it in all bulky, chunky cores, on many cores with overhang and on some of our complicated work.

In this period of our experience with the binder, a number of side benefits have been noted which were not fully apparent at the start. For example, the dry binder not only gives us fast mulling, but also permits a clean, safe condition on the floor around the muller. Dust occurs, of course, but the mix does not cake hard and presents no fire hazard.

Our sands are Michigan lake sand and Mexico Bay (local) lake sand. In a typical 320-lb batch of the core sand mix, cereal binder amounts to 0.8 per cent by weight and the dextrose binder to 1.2 per cent by weight. Five qt of water are used per 100 qt of sand, or 3.2 per cent by weight.

In another mix, used for higher green strength, the cereal content is raised to 0.9 per cent and the dextrose binder to 1.75 per cent. In this mix we add 4 qt per 100 of nonporous, AFS 150 molding sand. The muller cycle is 20 seconds dry, 90 seconds wet and 15 seconds with release agent, for a total of 125 seconds.

The dextrose binder is added dry. Sands, cereal and dextrose binder are weighed in, charged and mixed at one time.

The mixes have good flowability. Blowing is clear and good, and workability and other sand properties are well suited for either blowing or ramming.

Release Agent Used — Stripping has been no problem, although the dextrose binder undeniably is relatively sticky. The use of a release agent is imperative, and some experimenting may be necessary to determine the kind and amount that will produce best results. In this foundry, use of a release agent containing oleic acid and kerosene has proved most satisfactory.

With this formula, used liberally, there is no trouble with sticking. Cores slide easily from both wooden and aluminum boxes, although there occasionally may be a momentary hesitation before release is effected from the aluminum. Both types of containers stay reasonably clean and require very little wiping.

In our experience, the dextrose binder develops unusual green properties in the sands. This is not to say that it contributes directly to green strength. The mixes are, however, definitely rigid and cohesive. They maintain proper stand with less

FOR QUALITY THAT STANDS CLOSE INSPECTION

This BOKO Milling Machine was imported from Germany to complement Pyle facilities with its unusual versatility in milling, boring and turning operations especially suited to pattern production. Like all other equipment at Pyle, it is operated by highly skilled men averaging 17 years of experience to maintain the meticulous standards of quality our customers expect and deserve.

. . . we suggest you look to Pyle! Our business has been built serving customers who accept nothing less than perfection.

Here every wooden model is prepared in flawless detail by men averaging 19 years of patternmaking experience. Our integrated foundry is designed, equipped and operated exclusively for pattern production. We have the lathes, radial drills, milling machines, planers and hydraulic or automatic duplicators to meet your every need. Meticulous hand finishing and uncompromising inspection guarantee your complete satisfaction.

For fifty years we've made patterns for America's most quality-conscious firms. May we have the pleasure of making them for you?

PYLE

PATTERN AND MANUFACTURING COMPANY

Muskegon Heights, Michigan

Circle 779 on Inquiry Card—Page 51

MANY MAN HOURS SAVED BY REPAIRING CUPOLAS the "CEMENT GUN"® way

The CEMENT GUN is simple to operate; two or three of your own men can learn quickly and easily, after which they can make all your cupola repairs. With the CEMENT GUN they can place a lining 1" to 6" thick in one continuous operation. They can make patches in a "hot" furnace. They can place up to 5 thousand pounds of refractory material an hour. The CEMENT GUN method saves down time, saves material and extends the life of your present linings. Write today for our FREE bulletin #3000 and check our claims.

CEMENT GUN COMPANY
"GUNITE"® CONTRACTORS
1520 WALNUT ST., ALLENTOWN, PA.
Circle 759 on Inquiry Card—Page 51

COKE WHEN YOU WANT IT

Only Semet-Solvay has 4 coke plants to serve you. There's one in your vicinity. For fast service, for dependable, uniform coke that means "Better Melting" specify Semet-Solvay Foundry Coke.

SEMET-SOLVAY DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street — New York 6, N. Y.
Buffalo • Cincinnati — Cleveland • Detroit
In Canada: SEMET-SOLVAY COMPANY, LTD., Toronto
Western Distributor: WILSON & GEO. MEYER & CO., San Francisco
For Better Melting

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green strength than formerly was necessary. Green strength on a blow mix is tested to 0.45-lb compression. At this strength, cores exhibit adequate resistance to sag in the green condition. This characteristic is particularly noticeable, and welcome, in cores with a high stand or with overhangs.

As noted earlier, cores made from the dextrose binder bake quickly. Most of the baking of large cores is done in a vertical oven on a controlled cycle—baking time is one hour at 475° F. With the dextrose binder, even the bulkiest cores always bake through in a single pass.

Baked Strength Controlled—Baked strength can be controlled by varying the proportions of the mix, as can blowability of the sand, green properties and release characteristics. As with any other new product, we found it desirable to maintain close controls and complete records of the tests we made using different proportions of the mix ingredients.

This foundry is gradually changing over additional cores to the dextrose mixes. A total of 19 different mixes presently is used to satisfy all our core requirements. We believe that a broader use of the new binder will reduce the total number substantially.

One final characteristic also promotes quality of foundry output. The baked cores offer extremely good collapsibility. Removal is easy, fast and complete.

The dextrose binder is manufactured by Corn Products Sales Co., New York, under the tradename Dexocor.

Film Traces the Development Of an Engineered Casting

"The Big Difference" is a 16- minute sound-color film describing engineered castings made by Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

The story portrays the engineering approach in foundry operations by tracing the development of a typical Superior casting. Static and dynamic testing procedures are employed to determine the functional strength and weaknesses of an original part. These tests aid Superior engineers in designing a casting to replace the original part. After extensive testing, the casting generally proves to be lighter, stronger and less costly.

Loan copies of the film are available from the Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

Save Time, Maintenance and Money In Your Metal-Melting . . .

Specify Norton Refractory Cements

FOR FERROUS METAL-MELTING

type of equipment	metals melted	use of cement	Norton cement recommended			how applied
			number	maturing temperature		
indirect arc	alloy iron and steels	lining	RA 1307	1150°C	2100°F	rammed
		patching	RA 1307 RA 1162	1150°C 1000°C	2100°F 1850°F	rammed rammed
direct arc	alloy steel and malleable iron	troweling around electrodes	RA 1162	1000°C	1850°F	trowled
		lining roof and around electrodes	RA 1307	1150°C	2100°F	rammed
high frequency induction	stainless steel and refractory alloys	lining	RM 1170	1150°C	2100°F	rammed (dry)
		patching large furnaces	RM 1152	1200°C	2200°F	rammed
		patching small furnaces	RM 1992	1100°C	2000°F	troweled or rammed
ladles	iron and steel	lining	RA 1307	1150°C	2100°F	rammed

FOR NONFERROUS METAL-MELTING

low frequency induction	Al, Te, Si bronzes	lining	RM 1140	1250°C	2300°F	rammed
	general purposes	lining	RA 1307	1150°C	2100°F	rammed
indirect arc	brasses and bronzes	lining and patching	RA 1307	1150°C	2100°F	rammed
crucible melting furnaces ■	brasses and bronzes	lining and patching	RC 1188	1100°C	2000°F	rammed
reverberatory furnaces ▲	brasses and bronzes	lining and patching	RC 1188	1100°C	2000°F	rammed

■ Cement not in contact with metal; used in combustion chamber. ▲ Cement in contact with metal.

Norton ALUNDUM* fused alumina (RA), CRYSTOLON* silicon carbide (RC) and MAGNORITE* fused magnesia (RM) cements are stable and very refractory. Carefully blended to assure proper grain size distribution, they are excellent for the widest range of operations.

For complete facts as to the nature and selection of these *engineered and prescribed* Norton ℞'s, contact your Norton Representative. He'll supply you with the booklet *Norton Refractory Cements.* Or write for your free copy to NORTON COMPANY, Refractories Division, 304 New Bond Street, Worcester 6, Mass.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
REFRACTORIES
Engineered... ℞ ...Prescribed
Making better products... to make your products better
NORTON PRODUCTS: Refractories • Abrasives Grinding Wheels • Grinding Machines
BEHR-MANNING DIVISION PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

An unretouched photograph showing Laminated NOTAT TIRES performing under adverse conditions over aluminum clippings.

Now there are THREE kinds of tires . . . pneumatics, solids and Notats (Notats are neither solid nor pneumatic—they're LAMINATED!) This means that Notats can't go flat like pneumatics (there's no air chamber). And — unlike solid tires — Notats will "give" to prevent jarring of loads and damage to equipment. At in-plant speeds, Notats ride and steer like pneumatic tires. Notat's molded-together pads *grip* instead of *slip* . . . give faster starting, faster stopping.

For longer tire life, easier steering, better traction and no tire trouble, switch to NOTATS. In sizes from 4.00 x 8 to 9.00 x 24. Write for price list and catalog.

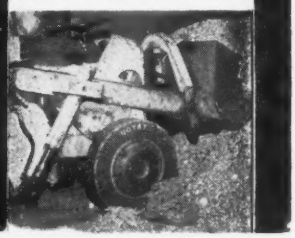
THE ORIGINAL LAMINATED TIRE — ACCEPT NO SUBSTITUTES

NO TUBE AIR TROUBLE

NOTAT TIRE COMPANY
1504 EAST 34th STREET
CHATTANOOGA, TENNESSEE

NO FLATS with NOTATS

The Plant Engineer of General Smelting Company (Philadelphia) reports: "Flats in pneumatic tires cost us too much down-time loss. We tried solid tires, but they were too hard on the men and equipment. Then we heard about Notats and tried them. They've solved our problem . . . no flats, no down-time due to tire trouble, yet they ride and grip like pneumatics".



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Knowing the facts . . . you'll choose Neff & Fry Bins

Super-Concrete Staves—virtually as hard and dense as natural stone—comprise the walls of Neff & Fry Bins (silos). The edges are tongued and grooved. The ends are diagonal so that surrounding hoops will impinge directly upon the horizontal joints.

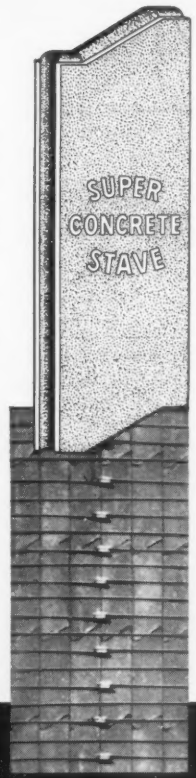
Each stave is 10″ wide x 30″ long x 2½″ thick. Note particularly the thickness. It means a Neff & Fry Bin has great interior capacity in relation to external diameter. It also means a substantial saving of cement compared to that used in thick-walled concrete bins.

Because the staves have crushing strength of up to 8,250 psi, Neff & Fry bins carry heavy superstructures without additional supports—and that can save a large amount of construction cost.

Neff & Fry Bins don't rot, rust, spall, or burn. They never need face-lifting.

And these are just a few of the facts. If you knew them all, you'd certainly choose Neff & Fry Bins when you need facilities for handling and storing any kind of flowable bulk material. Ask us for complete information.

Not exported except to Canada and Mexico.



THE NEFF & FRY CO.
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Human Factors Are Vital To Good Foremanship

There Are No Formulas For Handling Employees

By Ernest W. Fair

THE problems of day-to-day supervision are never easy ones to solve. The means used by foremen to simplify or expedite their work always requires study.

Not the least of the factors which call for endless investigation into better ways of doing the job is an understanding of the human factors involved in getting the most out of men. Maintenance of modern machines presents many problems, but not so many as effective utilization of the men who use these machines at their work.

Here, from actual job experience, are some of the short cuts to practical methods for handling men. They apply basically the same psychological approach a wife uses to get her husband to do extra chores around the house.

First is the thorough realization that no man can work efficiently who does not have an interest in his work. A dutiful husband may empty the garbage for the little woman, but he does it reluctantly. He will display the same lack of enthusiasm for his work on the job unless he has a vital interest in it.

Such an interest is inborn in some individuals, but every foreman knows that these men are as scarce as television sets at a theatreowner's convention. It is one of the primary functions of his job to insure that interest in the men who work under him.

Seek the Interest—No job can be so drab or routine that it does not have some element of interest. In many cases, all the foreman must do is discover that point (or create it), then point it out to the individual workman. In the routine of daily work, we often overlook a score of such elements. Whenever a deliberate effort is made to search them out, they usually become readily apparent.

The ultimate results of a man's work often can provide such interest. The routine skills he uses can be glamorized and made more important to him. Emphasis on more and more perfection (presented without "wifely nagging") can arouse an interest in seeking perfection on any job. No foreman ever should overlook an opportunity to give such ideas to the men under him.

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ably can keep in mind is to remember always that ability can be developed if an attitude is present in the individual workman. Without the proper attitudes, no amount of sweat on a foreman's brow can develop such ability.

Attitudes are made in great measure by interest in the individual's work, as mentioned above, as well as by the foreman's approach. Development of ability depends in great measure on his arousing the proper attitude toward the work on the part of each man.

Where the individual has a negative attitude toward his work, yet shows sufficient evidence of skill or ability to make the effort worth while, it will pay any foreman to try to eliminate the negative attitudes. Until this has been done, 90 per cent of his teaching efforts will be wasted.

"I give up on Mike—he's a stubborn mule that just won't learn. He simply has the wrong attitude," we heard a foreman say once. Mike may have been a stubborn cuss, but he may have had good reasons, too. The practical approach was not continued pounding by the foreman on handling the job but careful planning to remove Mike's obstruction. Once such a roadblock has been set aside, the task of teaching and instruction, which is a vital part of every foreman's job, becomes as easy as feeding ice cream to a boy.

Foremen who use this system accomplish their purpose by searching carefully for what lies behind the negative approach in Mike and his fellow workers. Once discovered, these negative ideas easily are removed and positive ones supplanted. Then ability can be developed to its maximum peak.

Abilities Can Be Hidden—Another factor the wise foreman always keeps in mind is that abilities can remain hidden if no one tries to bring them out. The ability to do a good job at any spot likewise will remain hidden until the foreman makes a deliberate effort to show the employee the proper response.

Once upon a time there was no income tax—and once upon a time foremanship called for hard and fast taskmastership over the given skills of an employee. Now we have plenty of income tax—and if we had as wide an application of the principle of an intelligent approach by foremen to bring out and develop skills and abilities, supervisory tasks would be much less difficult. Man really started taking over the face of the world when, in dim, prehistoric days, he began to use his fingers and thumbs for purposes other than to clout another man. The chances are that some individual was the leader

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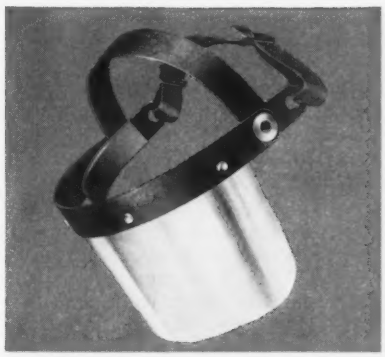

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Circle 726 on Inquiry Card—Page 51

in bringing out those abilities. He was a foreman of prehistoric times.

Change Comes Hard—Next on our list of shortcuts is thorough realization that the average man has a built-in resistance to change. Unless we keep this point constantly in mind, it will take us three to four times as long to develop major skills in a worker than it would if we approached our task without this principle. Old working habits must be changed in almost every instance. The foreman who realizes that each man has such a resistance to change built into his makeup and approaches his job problem with this fact in mind is the one who secures the most from his men with the least effort.

It also is important to keep in mind that to unlearn an emotional habit, one must learn another. Try to hurry it, and results never will be forthcoming. We all are creatures of emotion. The emotions necessary to a proper approach to our jobs do not come naturally. In most cases, we never acquire them unless we get rid of others which form a block to the new ideas.

Most foremen with experience are aware of this factor, but surveys show that many supervisors believe that changes can be made quickly. But it's a slow process.

When we have workers who obviously are not satisfied with their jobs, yet possess valuable skills and abilities, our first step always should be to discover what is causing the block and then to work at relieving it. When this has been done, conflict on the job is reduced.

Vary the Appeal—Another factor in good foremanship is that different appeals are required to obtain different results. One wife uses soft words to get her husband to do an unpleasant task, whereas another finds that hard words will bring more results.

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Formulas are pleasant. If we can discover one method of handling a given problem, it simplifies our work. But when it comes to handling men at work there are no such hard-and-fast formulas. Each man requires different appeals to secure maximum results. The foreman who uses this approach generally is the one whose staff has the best work record on every job.

Will Study Uses of Cobalt

First general assembly of the Cobalt Development Institute, organized in January, was held in Brussels, Belgium recently where the following officers were elected: Chairman M. Robiliart, Union Miniere de Haut-Katanga; vice chairmen E. C. Baring, Rhokana Corp. Ltd., and Ch. Piedboeuf, Centre d'Information du Cobalt.

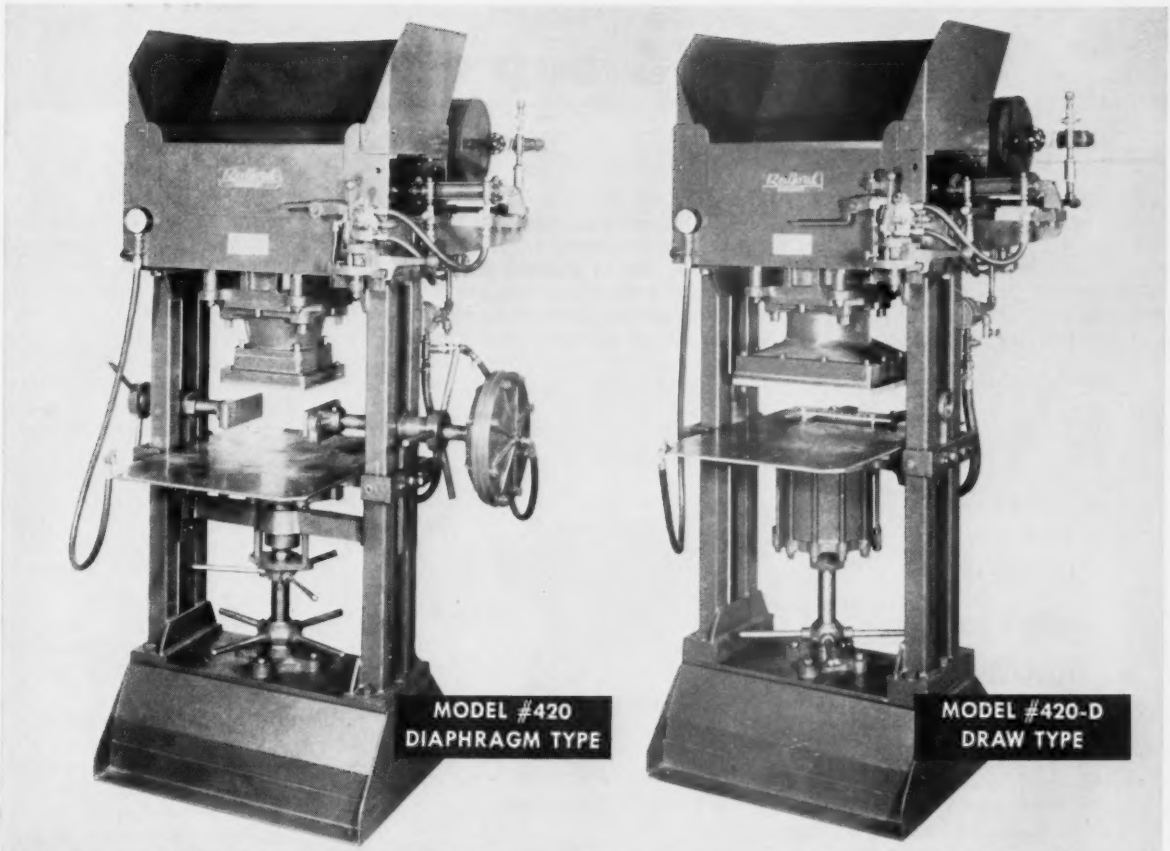
The institute is a technical and scientific organization composed of the world's major cobalt producers and its object is to improve existing uses of cobalt and develop new ones. Centre d'Information du Cobalt, 35 rue des Colonies, Brussels, will carry on the institute's program, and is represented in the United States by the Cobalt Information Center located at Battelle Memorial Institute, Columbus, O.

Book Review

Encyclopedia of Instrumentation for Industrial Hygiene, buckram, 1243 pages, 9 x 12 in., published by University of Michigan, Institute of Industrial Health and School of Public Health. Technical editors: C. D. Yaffe, A. D. Hosey and D. H. Byers. Price $30.

Extensive treatise on instrumentation contains seven sections covering over 500 instruments, produced by 60 manufacturers, for measuring air contaminants in occupied spaces, for use in laboratories, for air pollution and meteorology, for air velocity and metering, for sound and vibration, for ionizing radiations and for ultraviolet, visible and infrared energy.

Each section contains: 1. A comprehensive review of instrumentation in that area, including progress, problems, possibilities, limitations and needs not met by instruments now available. 2. Technical papers devoted to special problems or types of instruments used. 3. Descriptions of available instruments used for determination in this field, including complete pertinent data about price, operation, performance, limitations, maintenance, etc.



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BULLETIN #42

Foundry Group Meetings

Wisconsin: Management Night and Ladies Night attracted more than 500 members and guests of the AFS chapter to its March meeting at Hotel Schroeder, Milwaukee. Speaker was Clarence E. Manion, attorney, author, radio commentator and former dean of the Notre Dame law school. His subject was "The Management of Freedom." Mr. Manion was introduced by William J. Grede, president, Grede Foundries Inc.

The nominating committee presented its slate of nominees for officers and directors for 1957-1958. These are: President, Norman N. Amrhein, Federal Malleable Co.; vice president, Leslie J. Woehlke, Grede Foundries Inc.; secretary, L. J. Andres, Lawran Foundry Co., and treasurer, Bradley H. Booth, Carpenter Brothers Inc. Directors for three-year terms: Ralph J. Vanden Heuvel, Milwaukee Chaplet & Mfg. Co., and Charles Zahn, Vilter Mfg. Co. Harry Arneson, Spring City Pattern Works, was nominated to fill the unexpired directorship of the late Wesley Stokes.

The male glee club of the Belle City Malleable Iron Co., Racine, provided entertainment.—*John E. Hubel.*

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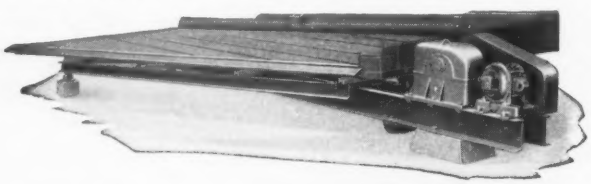

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San Antonio Section: Twenty-nine members and guests of the AFS chapter met at the Alamo Iron Works, San Antonio, Tex., on Mar. 18, and participated in a lively discussion of different ways that molding operations and equipment can cause shifts in loose pattern molding. Refreshments were served by Kincaid-Osburn Electric Steel Co.—*Kenneth E. Kielty, Alamo Iron Works.*

Connecticut Non-Ferrous: Julius Ferrari, Victor's Foundry, Guilford, Conn., touched on many of the "Variables in Plaster Molding" in his talk to the Connecticut Non-Ferrous Foundrymen's Association at its Feb. 19 meeting at the Quinnipiack Club, New Haven, Conn.

Pattern construction, material and tolerances, mixing methods, mold drying and pouring, mold permeability, gating, chills and use of vents, pop-offs, risers and whistlers were among the subjects covered thoroughly.—*Ralph D. Tierney.*

Pittsburgh: J. H. Bechtold, manager of the department of metallurgy, Research Laboratories, Westinghouse Electric Corp., Blairsville, Pa., discussed problems relating to the foundryman's constant search for methods of improving his product, at the Mar. 18 meeting of the AFS chapter at Webster Hall Hotel, Pittsburgh.

He called on his experience to elaborate on the potential effect which metallurgy will have on the future of the foundry industry. He urged members to design their product with modern metallurgical developments in mind. While describing the Blairs-

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ville pilot research plant and some of the work in new alloys and processes going on there, Mr. Bechtold reported that they are producing castings in small quantities to improve metal and techniques. Shell molding and vacuum casting are receiving much attention.—*Robert M. Love.*

Northwestern Pennsylvania: "Planning the 20th Century Foundry" was the subject of Dr. Robert Thompson, chief metallurgist, Research Division, General Motors Corp., at the Mar. 25 meeting of the AFS chapter at Amity Inn, Erie, Pa.

Dr. Thompson discussed the spectacular rise of die castings during the last eight years. He urged foundries to look to new methods to improve sand castings or they will continue to lose business to die casting and other fabricating methods. He suggested that foundries become more familiar with alloying and adding tracer elements to give common metals superior properties.—*Walter J. Yahn, American Sterilizer Co.*

Metropolitan: Warner B. Bishop, vice president and general manager, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, addressed the March meeting of the AFS chapter on "Which Core Process?" He discussed the advantages and disadvantages of four processes in most common use: 1. Conventional oil sand with cereal or resin. 2. Shell or hollow core. 3. Gas setting or CO_2 process. 4. Air setting.

Slides were shown illustrating the effect of baking temperature and addition sequence on the strength of the finished core. It was emphasized that each process has its own place in the foundry, and that since cores are expendable the process which can produce the most economical core of the required quality is the one to use.—*P. H. Flynn, International Nickel Co., Bayonne Works.*

New England: Prof. Howard Taylor's talk, "Food for Thought," attracted 150 members and guests of the AFS chapter to the University Club, Boston, on Feb. 13. Prof. Taylor covered the fundamental chemical and mechanical properties of clay and sand with a demonstration on the behavior of sand under various mechanical treatments.—*Ahti A. Erkkinen, Fremont Casting Co.*

Saginaw Valley: Seven senior students of the General Motors Institute of Technology participated in the speaking program at the Mar. 7 meeting of the AFS chapter at Fish-

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er's Hotel, Frankenmuth, Mich. The students, Bernard Billings, Lance Johnson, James Booth, George Mauch, Glen Ohl, Jerome Reaves and James Walpole, described their experiences in the various General Motors foundries where they have been assigned as part of their training. Technical chairman was John Lowe, instructor, General Motors Institute. He was assisted by Kenneth D. McKibben, president of the Institute's Foundrymen's Club.—*O. Requadt, Dow Chemical Co.*

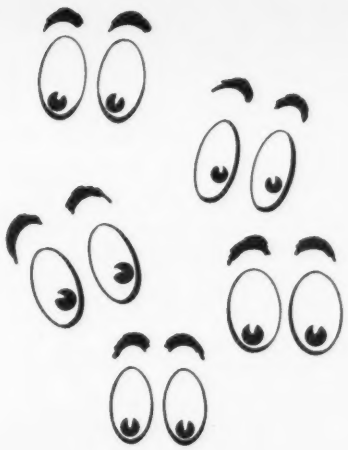
Philadelphia: "The Foundry Is a Good Place To Work" was the subject of Dr. William H. Ruten, Polytechnic Institute of Brooklyn, N. Y., as he talked to the AFS chapter at its Mar. 8 meeting at Dobbins Vocational School, Philadelphia. Attendance was 126, including visiting educators and students.

Dr. Ruten emphasized that the foundry industry is a basic, creative, progressive and challenging industry offering opportunities in many different kinds of jobs. Tom Walker, general manager, U. S. Pipe & Foundry Co., Burlington, N. J., speaking for industry, stressed the need for help from educators to encourage students to pursue careers in the foundry industry.—*Edward C. Klank, Philadelphia Coke Co.*

Utah: "Pattern Construction and Rigging-Improved Techniques in Coreblowing and Core Quality" was discussed by Richard L. Olson, President, Dike-O-Seal Inc., Chicago, at the March 18 meeting of the AFS chapter in Provo, Utah.

The nominating committee presented these nominations for officers and directors for the 1957-1958 season: Chairman, A. S. Klopf, manager of marketing, American Gilsonite Co.; 1st vice chairman, C. C. Cardall, plant superintendent, Pacific States Cast Iron Pipe Co.; 2nd vice chairman, D. N. Rosenblatt, chief metallurgist, American Foundry & Machine Co.; secretary, L. C. Skelton, assistant to foundry superintendent, Columbia-Geneva Steel Division, United States Steel Corp., and treasurer, Fred Hafen, general foundry foreman, Pacific States Cast Iron Pipe Co.

Nominations for director (three years): J. N. Carter, general manager, American Foundry & Machine Co., and W. W. Brown, plant metallurgist, Pacific States Cast Iron Pipe Co. Two years: Joy Nielson, foundry superintendent, Columbia-Geneva Division, United States Steel Corp., and Byron R. McKay, president, Star Brass Foundry & Refining Co. One year: Everett H.



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Backman, general manager, Backman Foundry Co., and Jack May, general manager, Lundin & May Foundry Co.—*J. Merrill Bushnell, Pacific States Cast Iron Pipe Co.*

Washington: The Engineers' Club, Seattle, Wash., was the meeting place for 60 members and guests of the AFS chapter at its March 21 meeting. Apprentice contest judging took place before the meeting. Prof. Gilbert Schaller, University of Washington, gave a coffee talk on the activities and papers presented at the California Regional Foundry Conference at Berkeley, Calif., during the preceding week.

Principal speaker was R. M. Ronne, Dependable Pattern Works, Portland, Oreg., speaking on "Coreboxes." Different types of coreboxes were described and the versatility of metal boxes was emphasized. Examples of desirable corebox design were shown. *William K. Gibb, Atlas Foundry & Machine Co.*

Texas: The AFS chapter met March 15 at the Hilton Hotel, Fort Worth, Tex., and heard a panel discussion on chaplets and chills in addition to seeing a motion picture on the same subject through the courtesy of the Fanner Mfg. Co.

Panel members were Edward W. Pruske, foundry superintendent, Alamo Iron Works; William J. Buford, foundry superintendent, Texas Steel Co.; Lester G. Robinson, superintendent, Trinity Valley Iron & Steel Co.; Charles Sibbitt, owner, Refinery Castings Co.; John Buster, purchasing agent, McKinley Iron Works and Harold H. Judson, director, Texas chapter, AFS.—*C. Eugene Silver.*

Chicago: William O. McFatridge, supervisor of foundry laboratory, Manufacturing Research, International Harvester Co., was nominated for 1957-58 president of the AFS chapter at its Apr. 1 meeting. Other officer nominees are: Vice President, Don G. Schmidt, metallurgist, H. Kramer & Co., and secretary, R. M. Frazier, service engineer, Hickman, Williams & Co.

Director nominees for 3-year terms are: Donald E. Meves, research metallurgist, American Steel Foundries; A. E. Gatto, pattern engineer, Continental Foundry & Machine Co.; K. J. Jacobson, chief chemist, Griffin Wheel Co., and retiring president, Robert P. Schauss, Werner G. Smith Inc. J. C. Mulholland, chief metallurgist, Pettibone-Mulliken Corp., was named to fill a 2-year vacancy as director.—*Erle F. Ross.*

A COMPLETE REFRACTORIES SERVICE...
for the Foundry Industry

BRIKRAM 80
A high alumina ramming mix, is giving outstanding service in many foundry furnace applications.

BRIKRAM 80 when rammed in place behind rigid forms, forms an excellent refractory lining wherein temperature and resistance to strong flux or slags are desired.

BRIKRAM 80 is used to construct the lower side walls and bottoms of aluminum melting and holding furnaces, center sections of electric furnace roofs and side walls and bottoms of malleable iron furnaces.

BRIKRAM 80, because of its high alumina content, is recommended for use in desulphurizing units where soda ash and other potent fluxes are used. Ladle life can also be increased by using BRIKRAM 80 in the places where the severe wear occurs. In case of ladles holding high temperature stainless steel, or other metals, long service is given by BRIKRAM 80.

For abrasion conditions, HIGH STRENGTH BRIKRAM 80 is available. This material takes a very hard air set and maintains it up to the softening point of the material.

Consult your local GREFCO representative for more complete details of these, and other GREFCO, products.

GENERAL REFRACTORIES CO.
Philadelphia 2, Pa.

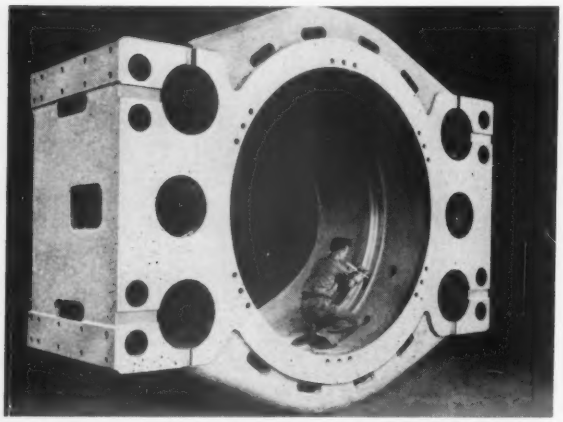
Circle 799 on Inquiry Card

GENERAL REFRACTORIES

The Shakeout

Giant Steel Casting Weighs 73 Tons

THE TOP PLATEN in the illustration which appears here will house the main cylinder of a new 6000-ton hydraulic no-draft forging press being built by Lake



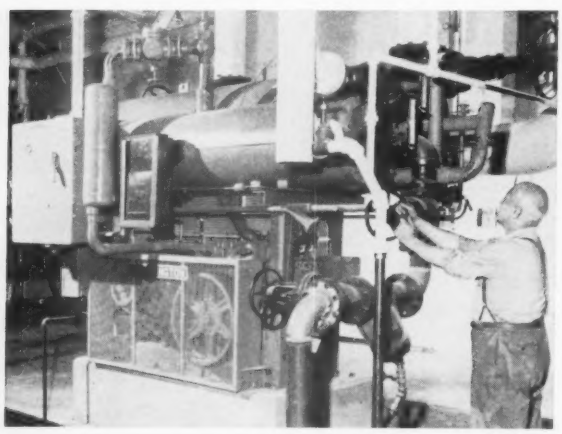
Erie Engineering Corp., Buffalo, for Prex Corp., Franklin Park, Ill. The entire press will weigh 750 tons, of which the top platen will comprise 75 tons, the moving platen 40 tons and the bottom platen 115 tons.

The 30-ft-high press has a bed area 60 x 108 in., stroke of 48 in., and a 72-in. daylight. The top platen is cast steel, ASTM-A27-55, class 70-36. As-cast weight was 149,580 lb, and the machined weight is 145,546 lb.

For More Details Circle No. 497—Page 326

Dehumidified Air Prolongs Tool Life

STEPS to reduce maintenance and increase the life of pneumatic tools by the use of dehumidified air have been taken by many plants which use such tools. By



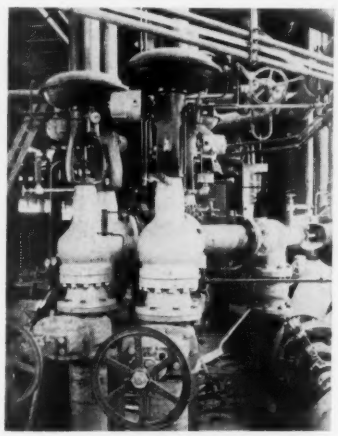
cutting the moisture content of compressed air, dehumidification prevents rusting as well as damage to tools through water carried through them in the form of droplets.

The liquid air chiller shown here is in operation at the power house of Buick Division of General Motors Corp. It is a product of Worthington Corp., Harrison, N. J. Worthington can design these units with as little at 1 psi air pressure through the chiller, thus affecting power savings.

For More Details Circle No. 498—Page 326

Stainless Castings Resist Extreme Conditions

A NEW $15½ million sulfate process tissue mill being completed by Hudson Pulp & Paper Co. at Palatka, Fla., will incorporate a wide variety of stainless castings at critical points. To achieve the predicted daily output of 200 tons, the new plant will use increased processing temperatures and pressures and severe corrosive solutions.



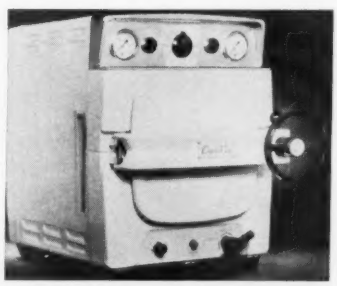
Engineers for the plant, J. E. Sirrine Co., Greenville, S. C., report that high-alloy castings will be employed in such units as fittings, control valves, heat exchangers, agitators, mixers and pumps. These components form the virtual "core" of the pulping operation.

One of the most widely used cast stainless alloys at the plant is type CF-8M (Alloy Casting Institute designation). A typical example of an important component using the corrosion-resistant properties of this alloy is the 300-lb control valve, shown here, which is used in rigorous digester service.

For More Details Circle No. 499—Page 326

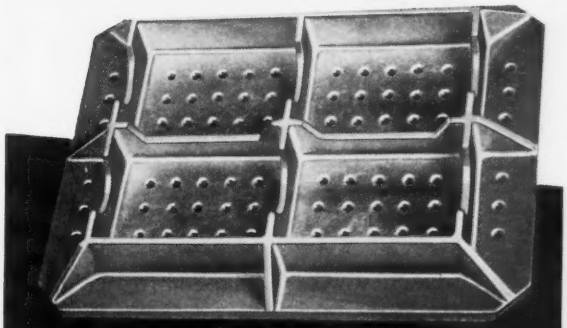
Instrument Sterilizer Uses Die Castings

THIS medical and dental sterilizer manufactured by Wilmot Castle Co. is believed to be the first product of its kind housed in die castings. Its advantages include superior appearance, good heat insulation, safe use and low cost. In addition, means are built into the castings to attach many of the 250 parts that go into the sterilizer.



Dies were produced for the price that would have gone into tooling to form the housing. Five of the castings that make up the back, front and door of the housing are solid aluminum. The sixth, or top instrument housing, is chrome-plated zinc. These castings currently are being produced, machined and finished at the integrated facilities of Precision Castings Co. at Fayetteville and Syracuse, N. Y. Precision is a division of Harsco Corp.

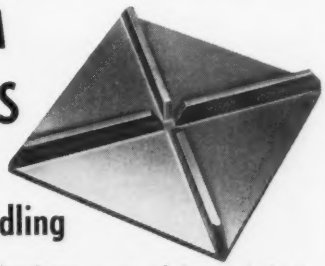
For More Details Circle No. 500—Page 326



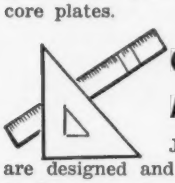
ALUMINUM BOTTOM BOARDS
give Infinite Life—Uniform Molds

JO-EL aluminum bottom boards have *infinite* life—assure uniform molds each cast. They eliminate the ever-increasing cost of labor and materials in making and continually replacing short-lived old-fashioned wooden boards that produce castings of questionable quality. Designed by practical foundrymen for better results and easier operation, they are cast of aluminum for light weight combined with maximum durability. Vent holes on face permit gas escapement. Will not warp or burn, are not affected by weather. Optional raised sand strip around outer edge peens each mold uniformly and eliminates sand slippage. Rib reinforcement assures added strength and durability. Stacking problems are eliminated. When you use JO-EL aluminum bottom boards, you eliminate a major source of foundry headaches and substantially reduce costs.

ALUMINUM CORE PLATES for Lightweight Handling



JO-EL light-weight aluminum core plates cut two man operations to one man. Exclusive design permits circulation below plate for much faster conduction than steel. They cut baking cycle time substantially, making possible increased casting production. Distribution of heat is more even, for a better finished product. You eliminate *all* core plate problems when you use JO-EL light-weight aluminum core plates.

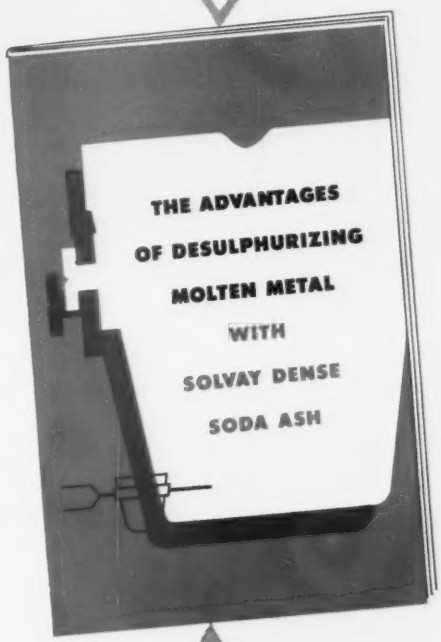


COMPLETE JO-EL ENGINEERING AND MANUFACTURING SERVICES

JO-EL bottom boards and core plates are designed and built to your specifications. Just send us a rough sketch and dimensions of the bottom boards and core plates you need, plus an indication of the quantity of each desired, and we'll provide a prompt quotation. For manpower and material saving, money-making aluminum, bottom boards and core plates, write, wire or call:

JO-EL COMPANY
Town & Country Building, 6188 Pearl Rd. Cleveland 30, Ohio
Phone: TUxedo 6-0434

Full facts on Desulphurizing at *lowest* cost!



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LIQUID BINDER

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CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

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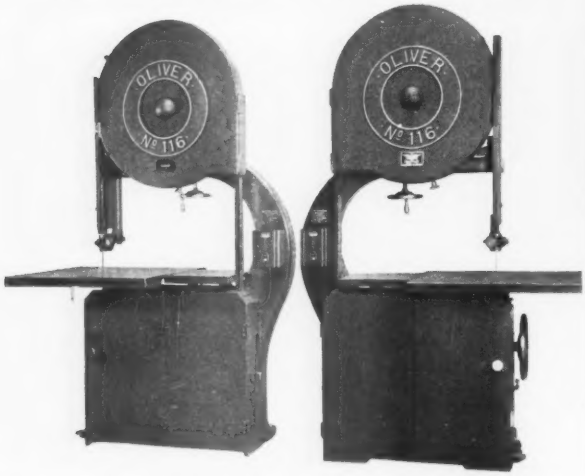
Circle 803 on Inquiry Card—Page 51

OLIVER left hand band saw
. . . simplifies work on large patterns



Used with a standard machine, the 36-inch *left hand* band saw gives unlimited capacity. It cuts any work done on the conventional machine. Oliver Band Saws have light, strong, ring-disk wheels—they run true without vibration at all speeds. Also cut metals. Saw guides have long-lasting carbide jaws. Write for Bulletin 116DL.

Oliver Band Saws also built in 18", 30", 36" sizes. For pattern shops Oliver has a complete line of finest woodworking equipment.

OLIVER MACHINERY CO., GRAND RAPIDS 4, MICH.

Circle 804 on Inquiry Card—Page 51

in **new**
all-weather
sanitary, tamper-proof
"throw-away" dispensers
of high impact styrene plastic

IN
2 sizes
500 Tablets
1000 Tablets
Easily Put Up
INDOORS OUTDOORS

"pep-up"®
The Original and Highest Quality
IMPREGNATED SALT TABLETS

- **combat heat fatigue**
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Impregnated to Prevent "Salt Sickness". Each salt crystal individually coated to give slow, controlled dissolving, to prolong benefits and eliminate nausea.

Made and packaged by USSSCO under U. S. Patent No. 2,478,182

A SIZE AND PACKAGE FOR EVERY NEED

Select from list below. New all-plastic dispensers at no increase in price.

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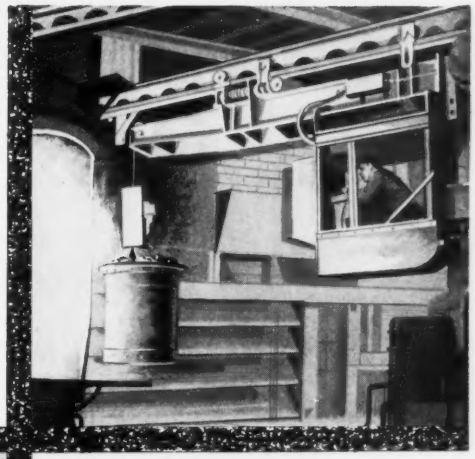
Circle 805 on Inquiry Card—Page 51



FOUNDRY INSTALLATIONS

Commercial Contracting Corporation has installed or modernized foundries for all the major automotive producers. Utilize this experience to up-date your own foundry facilities.

Write for information

COMMERCIAL CONTRACTING CORPORATION

GENERAL CONTRACTORS

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Circle 806 on Inquiry Card—Page 51

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

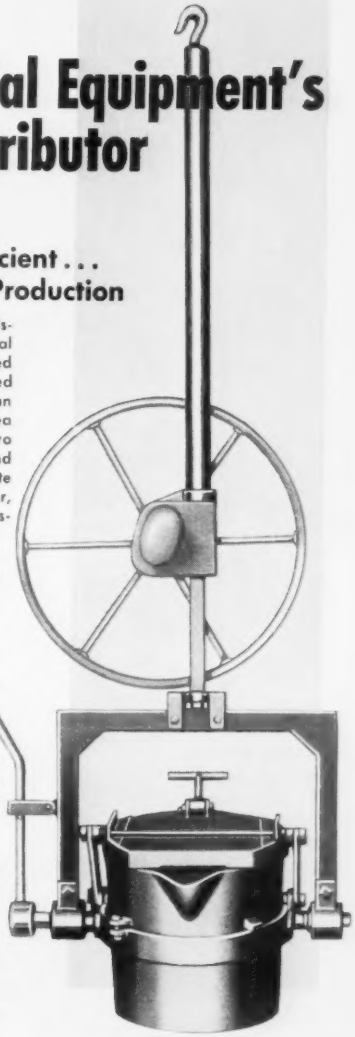
DAYTON, OHIO

Circle 807 on Inquiry Card—Page 51

Industrial Equipment's Distributor

Faster...
...More Efficient...
...Safer Production

Industrial Equipment's distributor for molten metal makes possible increased production without increased cost. It enables one man to pour a large floor area as fast or faster than two or more men using hand ladle pouring. Investigate the advantages of this safer, stronger, more efficient distributor.



- One hand control with low pull required to raise maximum load.
- Exceptional pouring ease
- Efficient load brake holds load at any desired position
- Entire rigid assembly swivels at top hook, and bail connection can be set at any position required
- Design combines maximum strength and low weight with large safety factor
- Minimum moving parts
- All parts enclosed in a compact housing — no wasted space
- All bearings anti-friction type sealed from dirt

Industrial Ladles

Pour More Metal Per Day—
Easier...Safer...With Less Man Power

Industrial Equipment Co. manufactures a complete line of standard ladles to provide faster, more accurate pouring in every type of foundry. Heat distortion and binding are eliminated, even if ladles are used all day without a chance to cool between pours. In addition to its standard ladles, Industrial also develops custom ladles for special applications.

WRITE TODAY FOR OUR COMPLETE CATALOG

Manufacturers of Constantly Improved Foundry Equipment Since 1900

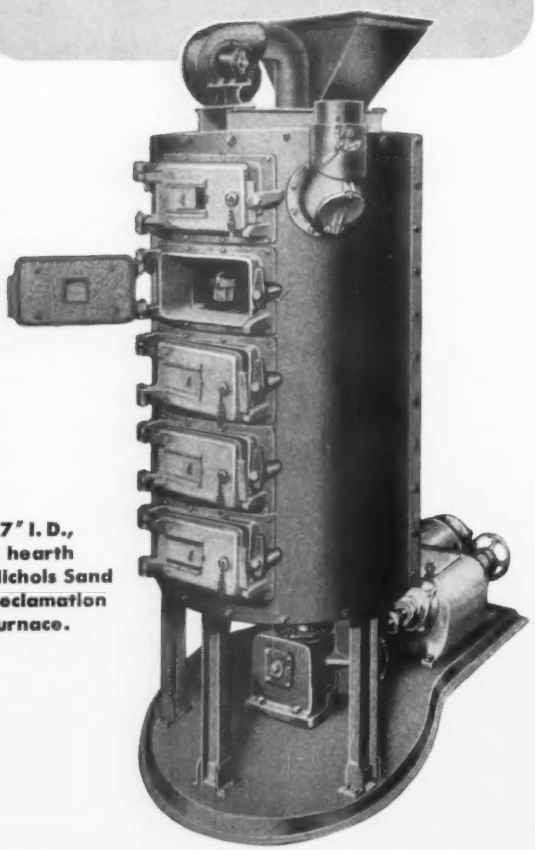
Ladles Bowls Shanks Bails Tongs

Industrial EQUIPMENT COMPANY

115 OHIO ST., MINSTER, OHIO

Circle 809 on Inquiry Card—Page 51

Soon-test the Nichols Sand Reclamation Furnace in *your* plant



27" I. D., 5 hearth Nichols Sand Reclamation Furnace.

Nichols is preparing to demonstrate—and prove—right in your own plant, what can be accomplished by Nichols Thermal Sand Reclamation. A pilot size Nichols furnace will soon be available.

Now is the time to request information and reserve the equipment for your use. Write, wire or call to Sand Reclamation Department . . .

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Circle 810 on Inquiry Card—Page 51

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Circle 811 on Inquiry Card—Page 51

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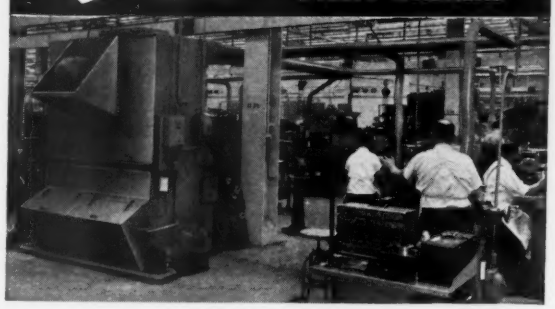
• INDUSTRIAL OVENS
• DUST COLLECTORS
• SPRAY BOOTHS
• PARTS WASHERS



UNI-WASH DUST COLLECTORS

Compact, complete recirculating Water-Type Dust Collectors for industrial processing dusts. Dirt is collected as wet sludge which may be carried away automatically. No moving parts. Extremely efficient for grinding operations. Eliminates danger of explosion from magnesium and aluminum dust. Proven in foundries. Standard Units available.

For Bulletins and Quotations, write to:
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Circle 812 on Inquiry Card—Page 51

Produce cast iron assemblies easily!
...with Ni-Rod electrodes

This weldor is completing fabrication of a grinder pedestal — profitable product of a Canadian foundry.

The design calls for joining the 1-inch steel-pipe uprights to the cast iron members. With easy-handling Ni-Rod* electrode, it's a *quick* job!

For the manufacturer, it's a *money-saving* job — far less costly than assembling the pedestal by machining and bolting.

Many shops and factories save time, reduce production costs, with Ni-Rod — the electrode with the nickel core wire and special flux. Even weldors of limited experience get good results. Strong, smooth welds. Machinability that is important in production work.

Another big advantage: preheat or postheat is seldom needed with Ni-Rod electrodes. And weld metal matches the color of the cast irons closely.

Produce or repair cast iron equipment with Ni-Rod and Ni-Rod "55"* welding electrodes — and save money in your plant, too. Send for Inco's folder called "Repair Cast Iron Parts, Quickly and Easily." It contains illustrated stories of successful welding: production work, emergency repairs, and more. Just write:

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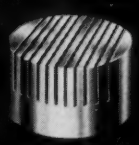
INCO TRADE MARK **WELDING PRODUCTS**

Electrodes
Wires
Fluxes

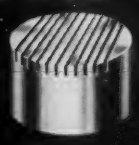
Weldor joins steel upright to bottom panel of grinder pedestal. He gets stable arc, smooth bead contour, sound deposits with Ni-Rod electrodes.

Circle 813 on Inquiry Card—Page 51

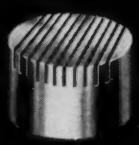
SLOTTED CORE BOX VENTS



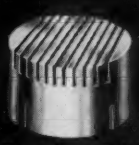
X-TRA DEEP HEAD .156 Wide Slots .014



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010



CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

INSERTING DRILL

- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

VENT CLEANER
- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

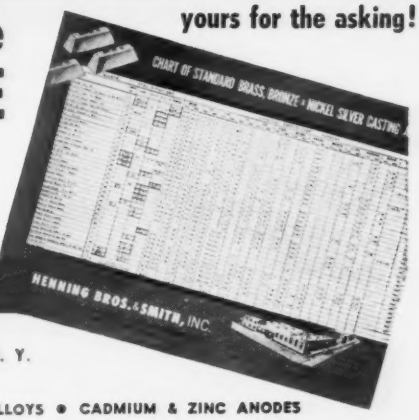
Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH

Circle 814 on Inquiry Card—Page 51

send for this valuable quick-reference 17" x 22" standard alloy wall chart FREE

yours for the asking!

This see-at-a-glance wall chart will save you hours of time in making up your specs. Chart shows all types of customer specifications: Navy, S.A.E., A.S.T.M., and Federal. It shows chemical composition, by percentages, of 37 alloys. Write today for your copy to:



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INCREASE PRODUCTION with the MURPHY PISTOL SPRAYER

$17.25
1/16" to ¼" pipe size
Any length nozzle desired

A squeeze of the trigger and the Murphy Pistol Sprayer instantly shoots a stream of blackening into inner pockets that could never be reached by old-fashioned brush or swab method. Designed by a foundryman, the Murphy Pistol Sprayer is ideal for cleaning permanent molds—aluminum and other metal, and for sand blasting.

Pipe size	1/16"	⅛"	¼"	⅜"	½"
Price F.O.B. Hamilton, O.	$17.25	$17.25	$17.25	$20.15	$25.30

Prices complete with 5 ft suction hose

EXTRA LONG NOZZLES FOR ⅜" SIZE
This size Sprayer can be furnished with nozzles up to 48" long for spraying ingot molds and hard to reach places . . . also available with curved nozzles up to 15" long.
Long Nozzle Sprayer $25.30

COMPLETE WATER ELIMINATION GUARANTEED WITH

We manufacture an extensive line of Aftercoolers (Vertical and Horizontal). Separators ½" to 6". Aftercoolers 50 cfm. to 10,000 cfm. Traps, (Air and Oil)

MURPHY COMPRESSED AIR EQUIPMENT

Shown here is a type B Automatic Separator guaranteed to remove all of the moisture and 90% of the oil from compressed air lines.

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AFTERCOOLERS
SEPARATORS
STRAINERS
TRAPS
SPRAY GUNS
PISTOL SPRAYERS

Circle 816 on Inquiry Card—Page 51

Core Wire Straighteners GIVE YOU BIG SAVINGS!

K&R Straighteners are saving foundries substantial sums monthly! Many of the larger foundries employ multiple installations of K&R Straighteners. These machines re-straighten core wire to a usable condition — over and over again — as long as it remains ductile. There are two machine sizes: DX-5 for wire ⅛" to ⅜" dia. and F-5 for wire 3/16" to ⅝" dia. Bulletin 58B contains all the facts. Send for your copy today.

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Zircon Sand
Zircon Flour
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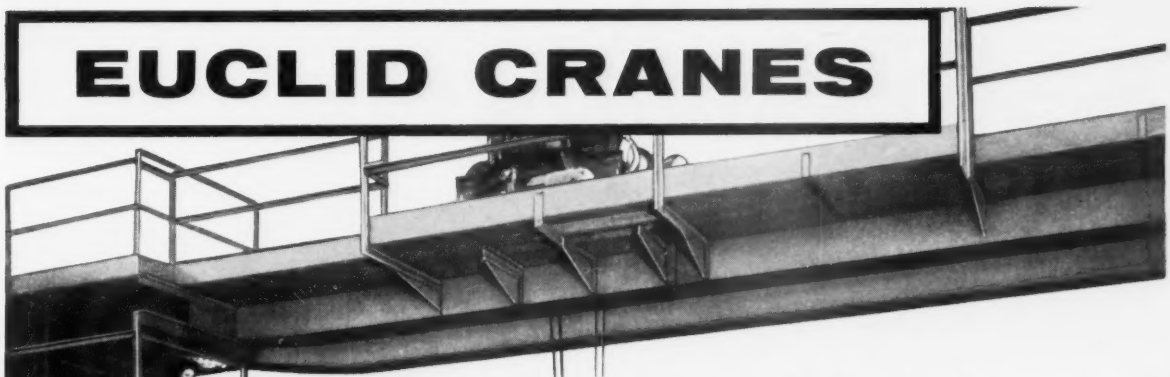
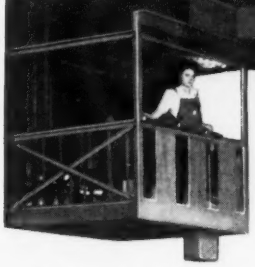
Circle 817 on Inquiry Card—Page 51

Circle 818 on Inquiry Card—Page 51

EUCLID CRANES





This 10 ton, 3 motor EUCLID CRANE is in operation at TEXAS ELECTRIC STEEL CASTING COMPANY.

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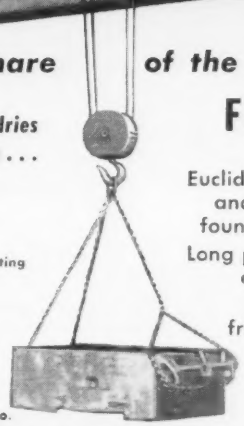

Euclid cranes in a wide variety of types and capacities are well established in many foundries.

Long periods of dependable, trouble-free service constitute their strongest recommendation.

Precision load control with dirt and dust free mechanism make them highly regarded.

Push-button or Rope Pendant floor control as well as overhead cab operation is available.

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TRU-SPRU

RUBBER DOWN SPRUE FORMER

TRU-SPRU

A SENSATIONAL ITEM FOR THE FOUNDRY

MADE OF RUBBER shop tested for proper resilience to do a real job for you. SIMPLE TO USE "TRU-SPRU" is provided with a small diameter hole at the bottom, which is placed over a pin fixed to the pattern. Add sand, jolt and squeeze. INCREASES PRODUCTION; eliminates cutting the sprue manually. "TRU-SPRU" is self releasing. "POPS" up for rapid removal. REDUCES SCRAP LOSS due to loose sand being washed into the mold cavity, and mis-location of the down sprue with respect to the runner.

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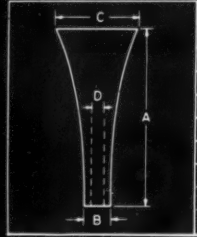

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MECHANIZATION

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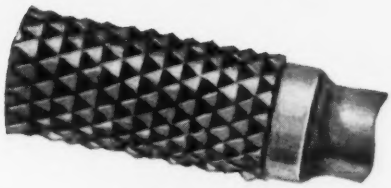

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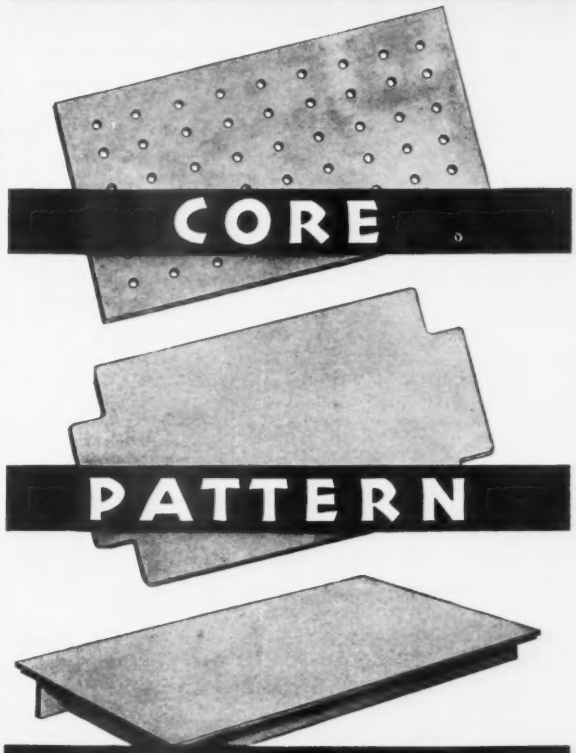

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BEAVER FALLS, PA. (Pittsburgh District)
Sales Offices in All Principal Cities

MOLTRUP

Circle 827 on Inquiry Card—Page 51

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

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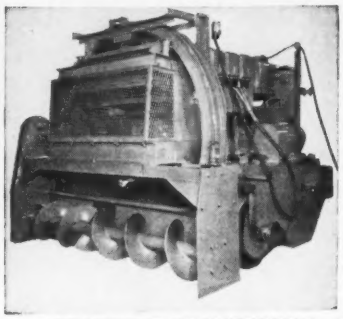

Ringlift prepared sand improves finish, reduces scrap, casts truer to pattern, increases molder output

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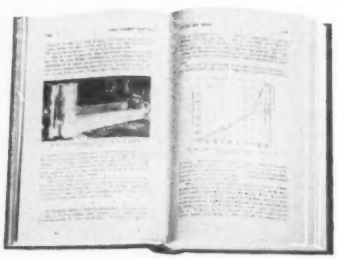
STEEL FOUNDRY PRACTICE

By JOHN HOWE HALL



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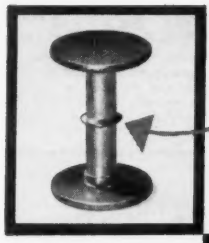
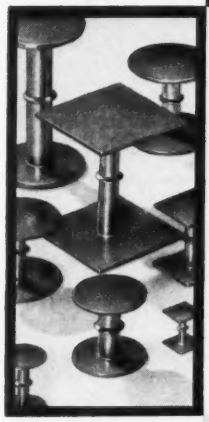
3. Gates and Heads
4. Machine Molding
5. Flasks and Rigging
6. Centrifugal Casting
7. Shakeout, Cleaning and Welding
8. Heat Treatment
9. Cast-Weld Construction
10. Open-Hearth Steelmaking
11. Electric Melting Furnaces
12. Converter Process
13. Pouring Practice



it's the fin that stops leakage

Buffalo **LEEK-PRUF-CHAPLETS**



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(Illustrated)

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Centrifugal Casting Machine Co.

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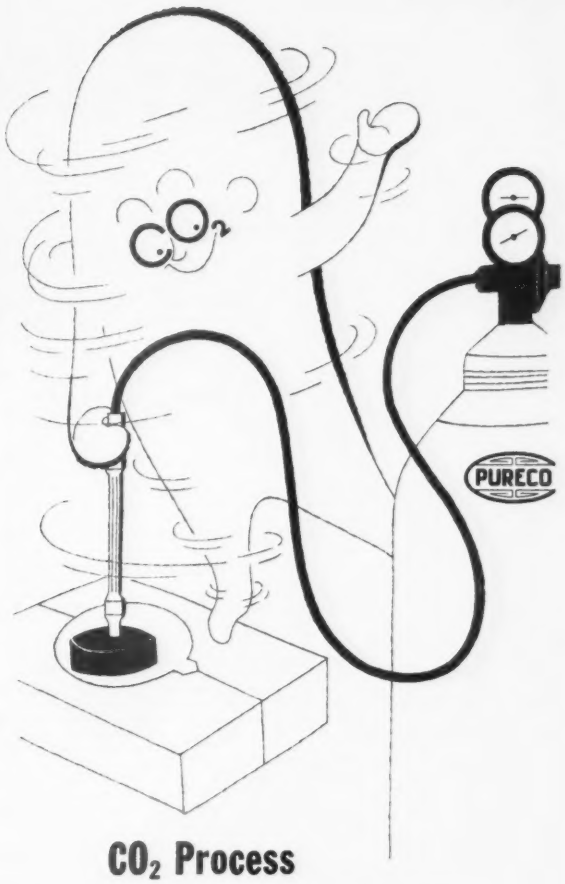

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Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Warner R. Thompson, 2055 West Grand Blvd., Detroit, Mich.

BOWLS and SHANKS

Industrial Equipment Co., Minster, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

BOXES (Stacking Tote)

Kirk & Blum Co., 3108 Forrer St., Cincinnati 9, Ohio.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

BRAKES (Magnetic)

Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

BRASS AND BRONZE INGOT

Federated Metals Div. of American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co., 11th & State Sts., Chicago Heights, Ill.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.
Schumann & Co. 4391 Bradley Rd. Cleveland 4, Ohio
Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

BRINELL TESTING EQUIPMENT

King Tester Corp., 440 North 13th St., Philadelphia, Pa.

BRIQUETS—See Type of Compound

BRIQUETTING MACHINERY (Metal)

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES (Bristle)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BRUSHES (Electrical)

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
U. S. Graphite Co., Saginaw, Mich.

BRUSHES (Wire)

Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.
Penn Iron Works, Inc., Reading, Pa.

BUILDING and ENGINEERING SERVICE

American Bridge Div., United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland, Ohio.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

BUSHINGS—See FLASK BUSHINGS and PINS

CADMIUM INGOT

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

CAR MOVERS

Frank G. Hough Co., Libertyville, Ill.
Jeffrey Mfg. Co., Columbus 16, Ohio.

CARBON BOOSTER

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
Carb-Rite Co., 1815 Halsted St., Chicago Heights, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

CARBON DIOXIDE—See GAS

CARBON DIOXIDE (Supply and Gassing Systems)

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Dry Ice Converter Corp., Box 1652, Tulsa, Okla.
Pure Carbonic Div., Air Reduction Co., 150 East 42nd St., Socony-Mobil Bldg., New York, N. Y.

CARBON INJECTION EQUIPMENT

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTING GRIPS (Air Powered)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Centrifugal)

Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Die)

Cast Master, Inc., 23901 Aurora Rd., Bedford Heights 14, Ohio.
Kux Machine Co., 6725 North Ridge Ave., Chicago 26, Ill.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co., Tulsa, Okla.

CASTING SEALER—See IMPREGNATING SYSTEMS

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

CEMENT (Metallic)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Devcon Co., Danvers, Mass.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories, Mexico, Mo.
Mullite Refractories, Shelton, Conn.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Chas. Taylor Sons Co., 710 Burns St., Cincinnati 4, Ohio.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Chisholm-Moore Hoist Div., Columbus-McKinnon Chain Corp., Tonawanda, New York.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

CHAPLETS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland Chaplet & Mfg. Co., 26470 Lakeland Blvd., Cleveland 23, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
W. L. Jenkins Co., 1445 Whipple Road, Southwest, Canton, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Smith & Richardson Mfg. Co., Geneva, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHEMICALS

General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.

CHILLS

Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
W. L. Jenkins Co., 1445 Whipple Road, Southwest, Canton, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 4th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Co., Port Huron, Mich.
Foundry Services, Inc., 200 Bruck St., Columbus 7, Ohio.

CHILL NAILS—See NAILS (chill)

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping) — See PNEUMATIC TOOLS and CHISELS

CHROMIUM (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

CLAMPS (Flask)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.

CLAY (Bonding)

Baroid Division, 332 South Michigan Ave., Chicago 4, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept. International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CLAY (Refractory)—See REFRACTORIES

CLEANING—See BLAST CLEANING EQUIPMENT

CLEANING COMPOUNDS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.

CLUTCHES (Magnetic, Friction)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

COATINGS—See CORE and MOLD WASH

COKE (Oven)

Alabama By-Products Corp., Post Office Box 354, Birmingham 1, Ala.
DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

CONVERTER BLOWERS—See BLOWERS

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., 174 Third St., Aurora, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Fabric, Rubber Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
B. F. Goodrich Co., Akron 18, Ohio.
Great Western Mfg. Co., Leavenworth, Kansas.
Imperial Belting Co., 1800 S. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Robinson Air Activated Conveyor Systems, 80 Fifth Ave., New York, N. Y.
Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.

CONVEYORS (Mold)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
Planet Corp., 1820 Sunset, Lansing 6, Mich.

CONVEYORS (Overhead Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works Inc., Reading, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Richards-Wilcox Mfg., 174 Third St., Aurora, Ill.
Whiting Corp., Harvey, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CONVEYORS (Vibrating, Oscillating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

CORE BINDERS

Acme Resin Corp., Forest Park, Ill.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 420 Lexington Ave., New York 17, N. Y.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Carver Foundry Products Co., Muscatine, Iowa.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
E. I. Du Pont de Nemours & Co. Inc., Wilmington 98, Delaware.
Durez Plastics Div., Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept., International Mineral & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland, Ohio.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Schenectady Resins, P.O. Box 1046, Schenectady, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
G. E. Smith, Inc., 246 Washington Rd., Pittsburgh 16, Pa.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Swan-Finch Oil Corp., 5849 West 66th St., Chicago 38, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE BLOWER BUSHINGS

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Martin Engineering Co., Neponset, Ill.

CORE BLOWING MACHINES

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., Muscatine, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

COREBOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

CORE COLORING

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit 7, Mich.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE DRIERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

COREMAKING MACHINES

Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Champion Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
Wadsworth Equipment Co., 2477 Magadore Rd., Akron, Ohio.

CORE OILS—See CORE BINDERS

CORE and MOLD OVENS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland 15, O.
Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundries Materials Co., Coldwater, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
R. C. Mahon Co. 6565 Eight Mile Rd. Detroit 34, Mich.
Michigan Oven Co., 419 Brainard St., Detroit 1, Mich.
Newcomb-Detroit Co., 5751 Russell St., Detroit 11, Mich.
Carl-Mayer Corp., 3030 Euclid Ave.,
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering, Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

CORE PASTE

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.

Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Warner R. Thompson, 2055 West Grand Blvd., Detroit, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)

American Foundry Flask Co., 2745 Southwest Blvd., Kansas City, Mo.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Champion Division, Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Crescent Brass & Pin Co., 5766 Tramrail Ave., Detroit, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Moltrup Steel Products Co., Beaver Falls, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Kane & Roach, Syracuse, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

CORE SAND—See SAND

CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT

CORE STRIPPERS—See CORE DRAWING MACHINES

CORE TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

CORE TRUCKS—See TRUCKS (Core)

CORE VENTS

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M., & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.

CORE and MOLD WASH

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., 6100 River Road, Washington 16, D. C.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Mullite Refractories, Shelton, Conn.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Warner R. Thompson, 2055 West Grand Blvd., Detroit, Mich.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Strainer, Ceramic)

Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Du-Co Ceramics Co. Box 587 Butler, Pa.
Louthan Corp., East Liverpool, Ohio.
Porcelain Products, Inc., Findlay, Ohio.
Universal Clay Products, Sandusky, Ohio.

COUPLINGS (Air, Hydraulic)

Aeroquip Corp., Jackson, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
C. B. Hunt & Sons Inc., Salem, Ohio.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

COUPLINGS (Flexible, Shaft)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Modern Equipment Co., Port Washington, Wis.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Self-Propelled)

Austin Western Co., 601 North Farnsworth, Aurora, Ill.
Baker-Raulang Company, 1250 West 80th St., Cleveland 2, Ohio.
Coles Cranes Inc., Joliet, Ill.
Modern Equipment Co., Port Washington, Wis.

CRUCIBLES

Ajax Electrothermic Corp., Trenton, N. J.
American Refractories & Crucible Corp. 547 Washington Ave. North Haven, Conn.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Electro Refractories & Abrasives Vars Building Buffalo, New York
Lava Crucible Co., Pittsburgh, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLAS (Hot Blast Equipment)

Modern Equipment Co., Port Washington, Wis.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

CUPOLA LIGHTERS

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA LININGS—See REFRACTORIES

CUPOLA PATCHING GUNS—See REFRACTORY GUNS

CUTOFF MACHINES (Abrasive)

DoAll Co., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg Co., Div. Turbo Machine Co., Lansdale, Pa.

CUTOFF WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.
Macklin Company, Jackson, Mich.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc. Manhattan Rubbber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

CUTTING OILS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CYLINDERS (Air)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.
Bellows Co., 230 West Market St., Akron 3, Ohio.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Corp, Des Plaines, Ill.
Logansport Machine Co., Inc., Logansport, Indiana.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

CYLINDERS (Hydraulic)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Hannifin Corp, Des Plaines, Ill.
Logansport Machine Co., Inc., Logansport, Indiana.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES

DEGASIFIERS and DEOXIDIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Foundry Services, Inc., 200 Bruck St., Columbus, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DESIGN TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

DESULPHURIZERS

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.
Carpenter Brothers Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div. Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Modern Equipment Co., Port Washington, Wis.
Olin Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DOWEL PINS

Standard Horse Nail Corp.,
New Brighton, Pa.

DRILLS (Electric)

Chicago Pneumatic Tool Co.,
6 E. 44th St., New York 17, N. Y.
U.S. Electrical Tool Co.,
3640 Llewellyn St.,
Cincinnati 23, Ohio.

DRILLS (Pneumatic)

Chicago Pneumatic Tool Co.,
6 E. 44th St., New York 17, N. Y.
Gardner-Denver Co.,
Quincy, Ill.

DRIVERS (Gear, Variable Speed)

Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DUMP HOPPERS

Kirk & Blum Mfg. Co.,
3108 Forrer St., Cincinnati 9, O.

DUMP TRUCKS

Kwik-Mix Co.,
3026 West Concordia,
Milwaukee 16, Wis.
Tractomotive Corp.,
Deerfield, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc.,
266 Central Ave., Louisville 8, Ky.
Barlett & Snow, C. O., Co.,
6201 Harvard Ave.,
Cleveland 5, O.
Chicago Blower Corp., 9867 Pacific Ave., Franklin Park, Ill.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Martin Equipment Co.,
P.O. Box 173, Wabash, Ind.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Peabody Engineering Co.,
232 Madison Ave.,
New York 16, N. Y.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.
Schneible Co., Claude B.,
2827 25th St.,
Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
U.S. Electrical Tool Co.,
3640 Llewellyn St.,
Cincinnati 23, Ohio.
Wheelabrator Corp.,
Mishawaka, Ind.

DYES & CHEMICALS

Eaton Chemical & Dyestuff Co.,
1490 Franklin, Detroit 7, Mich.

ELECTRIC FURNACES (See FURnaces, Electric)

ELECTRODES (Graphic and Amorphous)

Great Lakes Carbon Corp.,
579 Fifth Ave.,
New York 36, N. Y.

ELEVATORS (Bucket)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Great Western Mfg. Co.,
Leavenworth, Kansas.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
National Engineering Co.,
549 W. Washington St.,
Chicago 6, Ill.
Newaygo Engineering Co.,
Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave.,
Passaic, N. J.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Edwin S. Carman, 1643 Lee Road,
Cleveland 18, Ohio.
Commercial Contracting Corp.
12160 Cloverdale, Detroit, Mich.
Giffels & Vallet, Inc.,
Marquette Bldg., Detroit, Mich
Jeffrey Mfg. Co.,
907 N. Fourth St.,
Columbus 16, Ohio.
Lester B. Knight & Associates, Inc.,
549 West Randolph St.,
Chicago 6, Ill.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
Westover Corp.,
3110 W. Fond du Lac Avenue,
Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FABRICATORS (Metal)

Kirk & Blum Mfg. Co.,
3108 Forrer St.,
Cincinnati 9, Ohio.
Modern Equipment Co.,
Port Washington, Wis.
Newaygo Engineering Co.,
Newaygo, Mich.
Penn Iron Works, Inc.,
Reading, Pa.

FACINGS

M. A. Bell Co., 217 Lombard St.,
St. Louis 2, Mo.
Delta Oil Products Co.,
Milwaukee 9, Wis.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc.,
2000 Bruck St., Columbus 7, Ohio.
Stevens Inc., Frederic B.,
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3. Ill
United States Graphite Co.,
Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

FANS—See DUST COLLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FEEDERS (Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
Robins Conveyors,
Div. Hewitt-Robins Inc.,
270 Passaic Ave., Passaic, N. J.

FEEDERS (Rotary)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Fuller Company, Catasauqua, Pa.
Great Western Mfg. Co.,
Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
Newaygo Engineering Co.,
Newaygo, Mich.

FEEDERS (Vibrating)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Carrier Conveyor Corp.,
Frankfort Ave. at Clifton,
Louisville 6, Ky.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
Robins Conveyors,
Div. Hewitt-Robins Inc.,
270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co.,
Durand, Mich.

FERROBORON

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROCHROME

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Ohio Ferro Alloys Corp.,
Canton 9, Ohio.
Pickands, Mather & Co.,
Union Commerce Bldg.,
Cleveland 14, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

FERROMANGANESE

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Ohio Ferro Alloys Corp.,
Canton 9, Ohio.

FERROMOLYBDENUM

Climax Molybdenum Co.,
500 Fifth Ave.,
New York 36, N. Y.

FERROPHOSPHORUS

Eastern Clay Products Dept.,
International Minerals & Chemical Corp., 20 N. Wacker Drive,
Chicago 6, Ill.
Hickman-Williams & Co.,
Union Commerce Bldg.,
Cleveland 14, Ohio.

FERROSILICON

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro Alloys Corp.,
Canton 9, Ohio.
Pickands, Mather & Co.,
Union Commerce Bldg.,
Cleveland 14, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.

FERROVANADIUM

Electro Metallurgical Co., Div.
Union Carbide & Carbon Corp.,
420 Lexington Ave.,
New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILES (Rotary)

Essex Rotary File & Tool Corp.,
295 Madison Ave.,
New York 17, N. Y.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Hannifin Corp,
Des Plaines, Ill.

FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES

FLASK BANDS—See BANDS (Snap Flask)

FLASK BUSHINGS, PINS and FITTINGS

Adams Co., Dubuque, Iowa.
American Foundry Flask Co.,
2745 Southwest Blvd.,
Kansas City, Mo.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Foundry Flask & Equipment Co.,
Northville, Mich.
Hines Flask Co., 3431 W. 140th St.,
Cleveland 11, Ohio.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASK FILLERS

Bartlett & Snow, C. O., Co.,
6201 Harvard Ave.,
Cleveland 5, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp.,
2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASK LIFT MACHINES—See PATTERN DRAW MACHINES

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St.,
Cleveland 11, Ohio.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St.,
Cleveland 11, Ohio.
Newaygo Engineering Co.,
Newaygo, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St.,
Cleveland 11, Ohio.
Newaygo Engineering Co.,
Newaygo, Mich.
Stevens, Inc., Frederic B.,
Detroit 16, Mich.

FLASKS (Steel)

American Foundry Flask Co.,
2745 Southwest Blvd.,
Kansas City, Mo.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co.,
1928 W. 46th St., Chicago 9, Ill.

FLOORING (Non-Slip)

Walter Maguire Co.,
60 East 42nd St.,
New York 17, N. Y.
Norton Co., Worcester 6, Mass.

FLUXES

Cleveland Flux Co., 1026 Main St., Cleveland 13, Ohio.
Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FLUXES (Soldering, Welding and Tinning)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

FOUNDRY ENGINEERS (See ENGINEERING SERVICE)

FOUNDRY LAYOUT and METHODS (See ENGINEERING SERVICE)

FOUNDRY NAILS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Warner R. Thompson, 2055 West Grand Blvd., Detroit, Mich.

FURNACE BLOWERS—See BLOWERS

FURNACE LINING—See REFRACTORIES

FURNACES (Air)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Electric Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Inductotherm Corp., 412 Illinois Ave., Delanco, N. J.
Lectromelt Furnace Co. Div. McGraw Electric Co., P.O. Box 1125, Pittsburgh, Pa.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Swindell-Dressler, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

GAGGERS

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Wadsworth Equipment Co., 2477 Magadore Rd., Akron, Ohio.

GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)

Air Reduction Sales Co., 150 East 42nd St., Socony Mobil Bldg., New York 17, N. Y.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
Pure Carbonic Div., Air Reduction Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

GAS BURNERS—See BURNERS

GENERATORS (Acetylene)

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

GLOVES—See SAFETY CLOTHING

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

GRAPHITE and GRAPHITE BRIQUETS

Acheson Colloids Co., Port Huron, Mich.
Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Thor Power Tool Co., Aurora, Ill.
U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

GRINDERS (Pneumatic Portable)

Airtool Mfg. Co., Springfield, Ohio.
Aro Equipment Co., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.
Thor Power Tool Co., Aurora, Ill.

GRINDERS (Surface, Bench, Disc, Floor)

DoAll Co., Inc., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Thor Power Tool Co., Aurora, Ill.
U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.
U.S. Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio.

GRINDING WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Cincinnati Milling Machine Co., Cincinnati 9, Ohio.
Keystone Abrasive Wheel Co., Carnegie, Pa.
Macklin Co., Jackson, Mich.
Mid West Abrasive Co., Owosso, Mich.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
United States Rubber Co., 4300 New Haven Ave., Fort Wayne 4, Ind.

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephen Mfg. Co., Urbana, O.
Norton Co., Worcester, Mass.

GRINDSTONES—See GRINDING WHEELS

GRIT—See SHOT and GRIT

HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
King Tester Corp., 440 North 13th St., Philadelphia 23, Pa.
Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

HEAT CONTROL AND RECORDING DEVICES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Minneapolis-Honeywell Co. Wayne and Windrim Aves. Philadelphia 44, Pa.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Space, Unit, Oven, Water)

American Air Filter Co. Inc., Louisville 8, Ky.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.

HELMETS (Blasting)

American Optical Co., Southbridge, Mass.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Pangborn Corp., Hagerstown, Md.
Wheelabrator Corp., Mishawaka, Ind.

HELMETS (Welding)

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.
American Optical Co., Southbridge, Mass.

HOISTS (Air)

Aro Equipment Co., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

HOISTS (Chain, Hand)

Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.
Yale & Towne Mfg. Co. 11000 Roosevelt Blvd. Philadelphia 15, Pa.

HOISTS (Electric)

Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, New York.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., 1365 Chardon Rd., Cleveland 17, Ohio.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.
Yale & Towne Mfg. Co. 11000 Roosevelt Blvd. Philadelphia 15, Pa.

HOISTS (Skip)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Gardner-Denver Co., Quincy, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

HOODS (Shakeout, Pouring and Cooling)—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOSE (Air, Blasting, Water, Gas)

Aeroquip Corp., Jackson, Mich.
Gardner-Denver Co., Quincy, Ill.
B. F. Goodrich Co., Akron, Ohio.
Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Quaker Rubber Div. H. K. Porter Co., Tacony & Comly Sts., Philadelphia 24, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.

HOSE FITTINGS and REELS

Aeroquip Corp., Jackson, Mich.
A. Schrader's Son, 417 Vanderbilt Ave., Brooklyn 17, N. Y.

HOT TOP MATERIALS—See RISER COMPOUNDS

HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT

IMPREGNATING SYSTEMS and CASTING SEALER

Imprex Division
Ideal Industries, Inc.
2023 South 60th St.
Milwaukee 14, Wis.
Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

INGOTS—(See type of metal)

INOCULANTS

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.
Carb-Rite Co., 1815 Halsted St., Chicago Heights, Ill.
Carborundum Co., Perth Amboy, N. J.
United States Graphite Co., Saginaw, Mich.

INSPECTION EQUIPMENT

Allis-Chalmers, Milwaukee 1, Wis.
Dietert, Harry W., 9330 Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 9390 Grinnell Ave., Detroit 13, Mich.
Eastman Kodak Co., Rochester, N. Y.
King Tester Corp., 440 North 13th St., Philadelphia, Pa.
Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.
Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.

IRON OXIDES

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Delta Oil Products Co., Milwaukee 9, Wis.
Tamms Industries Inc., 228 No. La Salle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

JACKETS (Mold)—See MOLD JACKETS

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Great Western Mfg. Co., Leavenworth, Kansas.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Spincraft Inc., 4122 W. State St., Milwaukee 8, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS—See REFRACTORIES

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

LIFT TRUCKS (See Trucks, Power Lift)

LINERS (Shot Blast Equipment)

Gates Rubber Co., 999 South Broadway, Denver 17, Colo.

LINSEED OIL

Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Hercules Powder Co., Wilmington 99, Del.

LITHIUM

Lithium Corp. of America, Rand Tower, Minneapolis, Minn.

LOADERS

Barber-Greene Co., Aurora, Ill.
Clearfield Machine Co., Clearfield, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Front-End)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Clark Industrial Truck Div. Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.
Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.
Tractomotive Corp., Deerfield, Ill.

LUBRICANTS (Industrial)

Acheson Colloids Co., Port Huron, Mich.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Swan-Finch Oil Corp., 5849 West 66th St., Chicago 38, Ill.
United States Graphite Co., Saginaw, Mich.

LUBRICATING EQUIPMENT

Hannifin Corp, Des Plaines, Ill.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM INGOTS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MAGNETIC PARTICLE TESTING

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

MANGANESE (Briquets)

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

MATCHPLATE METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MEASURING DEVICES

Indicating Calipers Corp. 1359 York Ave. New York 21, N.Y.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

MIXERS (Core Wash)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

MOLD CONVEYORS — See CONVEYORS (Mold)

MOLD DRYERS

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

MOLD JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Products Engineering Co., Cape Girardeau, Missouri.

MOLD OVENS—See CORE and MOLD OVENS

MOLD SEAL COMPOUND

Presstite Keystone Engineering Products Co., 39th & Chouteau, St. Louis, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

MOLD WASH—See CORE and MOLD WASH

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Eastern Clay Products Dept. International Minerals & Chemicals Corp., 20 North Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div., Pettibone Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.
Milwaukee Foundry Equipment Div., SPO Inc., 3328 W. Pierce St., Milwaukee 4, Wis.
Nichols, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Permanent Mold Die Co., 2275 East 9 Mile Rd., Detroit, Mich.
SPO Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

MOLDING SANDS—See SAND

MOLYBDENUM and COMPOUNDS

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Link-Belt Co., Prudential Plaza, Chicago, Ill.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Chill)

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

NITROGEN—See GAS

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 121 South Division St., Ann Arbor, Mich.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers, Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Spraying Systems Co., Bellwood, Ill.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

OIL BURNERS —See BURNERS OPEN HEARTH DOORS

Wm. M. Bailey Co., Pittsburgh 16, Pa.

OPTICAL PYROMETERS—See PYROMETERS

OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)

OVENS (Core)—See CORE and MOLD OVENS

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
R. C. Mahon Co. 6565 Eight Mile Rd. Detroit 34, Mich.
Michigan Oven Co., 419 Brainard, Detroit 1, Mich
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OVENS (Mold Drying)—See CORE and MOLD OVENS

OXYGEN—See GAS

PAINT (Corrosion and heat resistant)

Speco, Inc., 7308 Associate Ave., Cleveland, Ohio.

PARTING COMPOUNDS

Acheson Colloids Co., Port Huron, Mich.
Archer-Daniels-Midland Co., Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Dow Corning Corp., Midland, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Superior Graphite Co. 33 S. Clark St. Chicago 3, Ill.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.

PATTERN COMPOUND

Devcon Co., Danvers, Mass.
Tamms Industries Inc., 228 N LaSalle St., Chicago 1, Ill.
United States Gypsum Co., 300 W. Adams St., Chicago 6, Ill.

PATTERN DRAW MACHINES

The Adams Co., Dubuque, Iowa.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

PATTERN LUMBER

Dougherty Lumber Co., 12100 Euclid Ave., Cleveland 6, Ohio.

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

PATTERN SHOP EQUIPMENT

DoAll Co., Des Plaines, Ill.
Oliver Machinery Company, Grand Rapids 2, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Anderson Pattern Inc., Muskegon Heights, Mich.
Automotive Pattern Co., 1884 John R. Street, Detroit 3, Mich.
Champion Div., Pettibone Mulliken Corp. 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Furane Plastics, 4516 Brazil St., Los Angeles 39, Calif.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Moltrup Steel Products Co., Beaver Falls, Pa.
Pyle Pattern & Mfg. Co., 2636 Sanford St., Muskegon Heights, Mich.
S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Southern Precision Pattern Works, 4410 First Ave., North, Birmingham, Ala.
United States Gypsum Co., 300 W. Adams St., Chicago 6, Ill.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS

PITCH

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

PLASTER (Pattern and Mold)

United States Gypsum Co., 300 W. Adams St., Chicago 6, Ill.

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS and CHISELS

Aro Equipment Co., Bryan, Ohio.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.
Superior Pneumatic & Mfg. Co., 4758 Warner Rd., Cleveland 25, Ohio.
Thor Power Tool Co., Aurora, Ill.

POURING DEVICES

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS

Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.

PUSH-OFF MACHINES—See PATTERN DRAW MACHINES

PUTTY (Foundry)

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Minneapolis-Honeywell Co. Wayne and Windrim Aves. Philadelphia 44, Pa.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

RACKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.
Metal & Thermit Corp., Rahway, New Jersey.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Ajax Electrothermic Corp., Trenton, N. J.
Babcock & Wilcox Co., 161 42nd St., New York 17, N. Y.
Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Cement Gun Co. 1520 Walnut St. Allentown, Pa.

Davis Fire Brick Co.,
Oak Hill, Ohio.
Delhi Foundry Sand Co.,
6326 Gracely Drive,
Cincinnati 33, Ohio.
Durex Refractories Co.,
P.O. Box 147, Jackson, Ohio.
Eastern Clay Products Dept.,
International Minerals & Chemical Corp., 20 N. Wacker Dr.,
Chicago 6, Ill.
General Refractories Co.,
1520 Locust St., Philadelphia 2, Pa.
Great Lakes Carbon Co.,
579 Fifth Ave.,
New York 36, N. Y.
A. P. Green Fire Brick Co.,
Mexico, Missouri.
Harbison-Walker Refractories Co.,
1745 Farmers Bank Bldg.,
Pittsburgh 22, Pa.
Hickman-Williams & Co.,
Union Commerce Bldg.,
Cleveland 14, Ohio.
Illinois Clay Products Co.,
Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Johns-Manville, 22 East 40th St.,
New York 16, N. Y.
Laclede Christy Div., H. K. Porter Co. Inc., 2000 Hampton Ave.,
St. Louis 10, Mo.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories Co.,
Mexico, Mo.
Mullite Refractories, Shelton, Conn.
North American Refractories Co.,
National City Bank Bldg.,
Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Frederic B. Stevens, Inc.,
18th St. & Vernor Highway,
Detroit 16, Mich.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Chas. Taylor Sons Co.,
710 Burns St., Cincinnati 4, Ohio.
United States Graphite Co.,
Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

REFRACTORY GUNS

Cement Gun Co.
1520 Walnut St.
Allentown, Pa.
Durex Refractories Co.,
P.O. Box 147, Jackson, Ohio.
Eastern Clay Products Dept.,
International Minerals & Chemicals Corp., 20 N. Wacker Drive,
Chicago 6, Ill.

RESIN (Shell Mold)

Acme Resin Corp., Forest Park, Ill.
Archer-Daniels-Midland Co.,
Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Bakelite Corp., 420 Lexington Ave.,
New York 17, N. Y.
The Borden Co., Thor Division,
350 Madison Ave.,
New York 17, N. Y.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd.,
North Tonawanda, N. Y.
General Electric Co.,
Chemical Materials Dept.,
1 Plastics Ave., Pittsfield, Mass.
B. F. Goodrich Chemical Co.,
3135 Euclid Ave., Cleveland, Ohio.
Hercules Powder Co.,
Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Plastics Engineering Co.,
1607 Geele, Sheboygan, Wis.
Reichhold Chemical Co.,
525 North Broadway,
White Plains, N. Y.
Schnectady Resins, P.O. Box 1046, Schenectady, New York.

RESPIRATORS

American Optical Co.,
Southbridge, Mass.

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

RIDDLES (Electric)

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co.,
2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co.,
Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Great Western Mfg. Co.,
Leavenworth, Kansas.
Frederic B. Stevens Inc.,
18th St. & Vernor Highway,
Detroit 16, Mich.

RISER COMPOUNDS

Foundry Services Inc.,
2000 Bruck St., Columbus, Ohio.
Pittsburgh Metals Purifying Co.,
1352 Marvista St.,
Pittsburgh 12, Pa.
U. S. Graphite Co.,
Saginaw, Mich.

ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY

ROLLER-HEARTH FURNACES — See FURNACES (Heat Treating and Annealing)

RUBBER LINING MATERIAL (Abrasive Resisting)

B. F. Goodrich Co., Akron 18, Ohio.
Pangborn Corp., Hagerstown, Md.

SAFETY EQUIPMENT

American Optical Co.,
Southbridge, Mass.
M. A. Bell Co., 217 Lombard St.,
St. Louis 2, Mo.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Industrial Gloves Co., Danville, Ill.
Pangborn Corp., Hagerstown, Md.
United States Rubber Co.,
4300 New Haven Ave.,
Ft. Wayne 4, Ind.

SAND (Core, Molding, Blasting)

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Delhi Foundry Sand Co.,
6326 Gracely Drive,
Cincinnati 33, Ohio.
Hardy Sand Co., P.O. Box 476,
Evansville, Indiana.
Hickman-Williams & Co.,
Union Commerce Bldg.,
Cleveland 14, Ohio.
Nugent Sand Co., Muskegon, Mich.
Orefraction Inc., 7425 Thomas St.,
Pittsburgh 8, Pa.
Ottawa Silica Co.,
Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Glass Sand Corp.,
140 Stanwix St.,
Pittsburgh 22, Pa.
Standard Silica Co.,
Ottawa, Ill.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SALT AND SALT TABLETS

U.S. Safety Service Co.,
1331 Oak St., Kansas City 6, Mo.

SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT

SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT

SAND CONTROL and TESTING EQUIPMENT

Beardsley & Piper Div. Pettibone Mulliken Corp.,
2424 No. Cicero, Chicago 39, Ill.
Carpenter Brothers, Inc.,
606 West Wisconsin Ave.,
Milwaukee 3, Wis.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co.,
Leavenworth, Kans.
Hartley Controls Corp., Neenah, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND DRYERS

Allis-Chalmers Mfg. Co.,
Milwaukee 1, Wis.
Bartlett & Snow Co., C. O.,
6201 Harvard Ave.,
Cleveland 5, Ohio.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
Nichols Engineering & Research Corp., 70 Pine St.,
New York 5, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Oliver Machinery Company,
Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS—See SAND PREPARATION EQUIPMENT

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co.,
Milwaukee 1, Wis.
American Air Filter Co.,
Louisville 8, Ky.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp.,
2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Carver Foundry Products Co.,
1056 Hershey Ave.,
Muscatine, Iowa.
Champion Div.,
Pettibone Mulliken Corp.,
2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Cleveland Tramrail Div.,
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Diester Concentrator Co.,
901 Glasgow Ave., Ft. Wayne, Ind.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Foundry Supplies & Mfg. Co.,
2221 Orchard St., Chicago 14, Ill.
B. F. Goodrich Co., Akron 18, Ohio.
Great Western Mfg. Co.,
Leavenworth, Kansas.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Company, Prudential Plaza, Chicago 1, Ill.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Moulders Friend, Dallas, City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co.,
Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pekay Machine & Engineering Co., 865 N. Sangamon St.,
Chicago 22, Ill.
Planet Corp., 1820 Sunset,
Lansing 6, Mich.
Royer Foundry & Machine Co.,
Kingston, Pa.
Shallway Muller Corp.,
Hoosick Falls, New York.
Simplicity Engineering Co.,
Durand, Mich.
States Engineering Corp.,
922 W. Berry, Ft. Wayne 2, Ind.
Wheelabrator Corp.,
Mishawaka, Ind.

SAND RAMMERS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co.,
Dayton 1, O.
Master Pneumatic Tool Co., Inc.,
Orwell, Ohio.
Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.

SAND RECLAIMERS

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 70 Pine St.,
New York 5, N. Y.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STABILIZER

Archer-Daniels-Midland Co.,
Foundry Products Division, 2191 W. 110th St., Cleveland 2, Ohio.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.

SAND STORAGE BINS and GATES

American Bridge Div., United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Bartlett & Snow, C. O., Co.,
6201 Harvard Ave.,
Cleveland 5, Ohio.
Beardsley & Piper Div., Pettibone Mulliken Corp.,
2424 No. Cicero, Chicago 39, Ill.
Link-Belt Co., Prudential Plaza,
Chicago 1, Ill.
Marietta Concrete Corp.,
Marietta, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, Ohio.
Newaygo Engineering Co.,
Newaygo, Mich.
Planet Corp., 1820 Sunset,
Lansing 6, Mich.

SAW SHARPENING SERVICE

Hinckley Industries, Inc.,
Post Office Box 1100,
Brunswick, Ohio.

SAWS (Band, Metal, Wood)

Chicago Pneumatic Tool Co.,
6 E. 44th St., New York 17, N. Y.
DoAll Co., Des Plaines, Ill.
Hinckley Industries, Inc.,
Post Office Box 1100,
Brunswick, Ohio.
Oliver Machinery Company,
Grand Rapids 2, Mich.

SCALING HAMMERS—See PNEUMATIC TOOLS and CHISELS

SCRAP (Iron & Steel)

Luria Brothers
Philadelphia National Bank Bldg.
Philadelphia 7, Pa.

SCREENS (Shakeout and Vibrating)

Ajax Flexible Coupling Co.,
Westfield, N. Y.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Diester Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

SEA COAL

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.
Jas. A. Murphy & Co., Hamilton, O.
C. A. Norgren Co., 3400 South Elati, Englewood, Calif.
Pangborn Corp., Hagerstown, Md.
A Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

SEPARATORS (Magnetic)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
The Branford Co., 130 Chestnut St., New Haven 7, Conn.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHELL MOLDING (Equipment and Accessories)

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
C & S Products Co., 12733 Fullerton Ave., Detroit 27, Mich.
Carver Foundry Products, Muscatine, Iowa.
Centrifugal Casting Machine Co., Tulsa, Okla.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
SPO Inc., 7500 Grand Division Ave., Cleveland 5, Ohio.
Shalco Engineering Corp., Palo Alto, Calif.
Shallway Muller Corp., Hoosick Falls, New York.
Shell Process Inc., McKinstry Ave., Chicopee, Mass.
Sutter Products Co., Hadley & Grant Sts., Holly, Mich.

SHELL MOLD SAND (Coated)

Acme Resin Corp., Forest Park, Ill.

SHELL MOLDS—See RESIN

SHOT AND GRIT

Abrasive Shot and Grit Company, Springville, New York.
Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
Carborundum Co., Niagara Falls, N. Y.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Delhi Foundry Sand Co., 6326 Gracely Drive, Cincinnati 33, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Steel Shot Producers, Inc. Butler, Pa.
Wheelabrator Corp., Mishawaka, Ind.

SHOT (Peening)—See SHOT and GRIT

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

SILICA FLOUR

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.
Ottawa Silica Co., Ottawa, Ill.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Standard Silica Co., Ottawa, Ill.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

SILICOMANGANESE

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Pickands-Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SILICON (Briquets)

Electro Metallurgical Co., Div., Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.
Ohio Ferro Alloys Corp., Canton 9, Ohio.
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

SILICON CARBIDE (Briquets)

Ohio Ferro Alloys Corp., Canton 9, Ohio.

SILVERY PIG IRON—See PIG IRON (Silvery)

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Industries Inc., 228 North LaSalle St., Chicago 1, Ill.

SLINGS (Chain)—See CHAIN

SLIP FLASKS—See FLASKS, (Slip)

SLIP JACKETS—See MOLD JACKETS

SMELTERS and REFINERS

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SNAP FLASKS—See FLASKS (Snap)

SODA ASH

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPECTROGRAPHIC ANALYSIS

Baird-Atomic, Inc. 33 University Rd. Cambridge 38, Mass.
Spectrochemical Laboratories, Inc., P.O. Box 8781, Pittsburgh 20, Pa.

SPRAY GUNS

The Branford Co., 130 Chestnut St., New Haven 7, Conn.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio.
Murphy & Co., Jas. A., Hamilton, O.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Keson Industries Box 11 Berwyn, Ill.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.
Rice Pump & Machine Co., Belgium, Wis.

STEEL SHOT—See SHOT and GRIT

STEEL (Structural)

American Bridge Co., Div., United States Steel Corp., 52 S. Wm. Penn Place, Pittsburgh 19, Pa.

STRAINER CORES—See CORES (Strainer, Ceramic)

STRIPPING MACHINES—See PATTERN DRAW MACHINES

TANK TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TANKS (Dewatering)

Claude B. Schneible Co., 2827 25th St. Detroit 2, Mich.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Minneapolis-Honeywell Co. Wayne and Windrim Aves. Philadelphia 44, Pa.

TENSILE TESTING MACHINES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines, Inc., 8817 Lyndon, Detroit 21, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill

TIMERS (Electric)

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

TIRES (Industrial)

Mitchell Industrial Tire Co., 1400 East 40th St., Chattanooga 7, Tenn.

Notat Tire Co., P.O. Box 1814, East Lake Station, Chattanooga, Tenn.

TONGS

Industrial Equipment Co., Minster, O.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

TORCHES (Gouging and Cutting)—See WELDING, CUTTING and GOUGING APPARATUS

TOTE BOXES—See BOXES (Stacking, Tote)

TRACTORS—See TRUCKS (Utility and Power Lift)

TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

TROLLEYS

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Modern Equipment Co., Port Washington, Wis.

Yale & Towne Mfg. Co. 11000 Roosevelt Blvd. Philadelphia 15, Pa.

TRUCK CRANES

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

TRUCKS (Core)

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Utility and Power Lift)

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.

Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio.

Tractomotive Corp., Deerfield, Ill.

Yale & Towne Mfg. Co. 11000 Roosevelt Blvd. Philadelphia 15, Pa.

TUMBLING BARRELS

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TUMBLING BARRELS (cleaning compounds)

Almco Div. Queen Stove Works, Albert Lea, Minn.

TURNTABLES

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

Modern Equipment Co., Port Washington, Wis.

Newaygo Engineering Co., Newaygo, Mich.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNLOADERS (Car)

Barber-Green Co., Aurora, Ill.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

VACUUM DEGASSING EQUIPMENT

Centrifugal Casting Machine Co., Tulsa, Okla.

VALVES (Air, Oil, Water, Steam)

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio.

Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.

North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio.

VALVES (Blow-off and Cut-off)

Bellows Co., 230 West Market St., Akron 3, Ohio.

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.

C. B. Hunt & Sons Inc., Salem, Ohio.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

VENTILATING — See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

VENTS (Corebox)

Carver Foundry Products Co., 1056 Hershey Ave., Muscatine, Iowa.

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.

Demmler, Wm., & Bros., Kewanee, Ill.

C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.

Beardsley & Piper., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.

The Branford Co., 130 Chestnut St., New Haven 7, Conn.

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

Davenport Machine & Foundry Co., Davenport, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Martin Engineering Co., Neponset, Ill.

Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co., Urbana, Ohio.

WASHES—See CORE and MOLD WASH

WEDGES (Foundry)

Adams Co., Dubuque, Iowa.

WELDING APPARATUS (Electric Arc, Inert Gas)

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Miller Electric Mfg. Co., Appleton, Wis.

A. O. Smith Corp., 3533 North 27th St., Milwaukee 1, Wis.

WELDING, CUTTING and GOUGING APPARATUS and SUPPLIES

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Hoeganaes Sponge Iron Corp., Riverton, New Jersey.

Linde Air Products Co., Div., Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

A. O. Smith Corp., 3533 North 27th St., Milwaukee 1, Wis.

Wilson Welding Co., 221 High St., Altizer Addition. Huntington, W. Va.

WELDING ELECTRODES (Carbon)

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.

United States Graphite Co., Saginaw, Mich.

WELDING GAS—See GAS

WELDING RODS and ELECTRODES

Air Reduction Sales Co., 150 East 42nd St., Socony-Mobil Bldg., New York 17, N. Y.

Carborundum Co., Perth Amboy, N. J.

International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Linde Air Products Co., Div., Union Carbide & Carbon Corp., 420 Lexington Ave., New York 17, N. Y.

A. O. Smith Corp., 3533 North 27th St., Milwaukee 1, Wis.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS (Abrasive Contact)

Chicago Rubber Co., 2620 North Clybourn, Chicago 14, Ill.

Keystone Abrasive Wheel Co., Carnegie, Pa.

WHEELS (Wire Brush)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

WOOD FLOUR

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Hardy Sand Co., P.O. Box 476, Evansville, Indiana.

WIRE NAILS

Republic Steel Corp., 3100 E. 75th St., Cleveland 27, Ohio.

WIRE ROPE

American Chain & Cable Co., Inc., 271 South Pennsylvania Ave., Wilkes-Barre, Pa.

WOODWORKING MACHINERY

DoAll Company, Des Plaines, Ill.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Ameray Corp., Kenvil, N. J.
Ansco Co., 171 Clinton St., Binghamton, New York.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

X-RAY FILM and ACCESSORIES

Ansco Co., 171 Clinton St., Binghamton, New York.

Eastman Kodak Co., Rochester, N. Y.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Benjamin Harris & Co. 11th & State Sts. Chicago Heights, Ill.

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

ZIRCON SAND

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Berkshire Chemicals, Inc., 420 Lexington Ave., New York 17, N. Y.

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

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Small jobbing foundry in Western Canada requires superintendent with knowledge of all phases of iron foundry production including Ductile Iron. Please send qualifications, references, late picture and salary requirements. Address: Box 588, FOUNDRY, Penton Bldg., Cleveland 13 ,Ohio.

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Journeyman molder needed for foreman in gray iron jobbing foundry in Cleveland area for medium and large floor work. In reply give age, experience, references and include photographs. Address: Box. 539, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

To take charge of molding floor for medium sized stainless foundry. Must know gating, risering, sand control and management of men. Age under 40. Address: Box 548, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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A steel foundry in the Detroit area has an opening for a qualified man, must be fully experienced in electric melting practice. Send complete resume. Address: Box 571, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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(3) Cast iron, ductile iron and malleable iron.
(4) Aluminum alloys, copper alloys, titanium metals and other nonferrous fields.
To qualify for any of these positions, applicants should have an engineering degree, five or more years' practical experience in production, processing and metallurgical development, and the ability to carry out constructive field assignments in pilot and production operations. Confidential. Send complete resume, and state salary anticipated to:

MR. H. S. SCHAUFUS
CHIEF METALLURGICAL ENGINEER
VANADIUM CORPORATION OF AMERICA
RESEARCH CENTER
CAMBRIDGE, OHIO

DESIGNERS-DRAFTSMEN-ENGINEERS

Experienced in foundry layouts and equipment. Send experience record, personal data, recent photo and reference prior to personal interview.

BOX 530, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CASTING ENGINEER

For leading oil field equipment manufacturing firm in Houston, Texas. Prefer Mechanical Engineering Degree with foundry option but will consider Metallurgical or Industrial Engineer with adequate experience. Age to 35 with minimum of 5 years' experience in steel foundry operations dealing with casting design and pouring. Job entails liaison and coordination of all activities connected with setting up and operating a gray iron and steel foundry. Excellent promotional opportunity. Please furnish resume including salary requirement. Address: Box 554, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

QUALITY CONTROL

Gray iron foundry on Eastern seaboard has opening for exceptional individual. Progressive expanding organization with unusual possibilities for future. Must have extensive knowledge of all phases of sand control and preparation, cupola operations and lab and testing program. Full responsibility for these phases reporting directly to top foundry management. Requires unusual combination of metallurgical knowledge and practical know-how. Send complete resume in strictest confidence. Address: Box 558, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOREMAN

Excellent opportunity for versatile man in progressive medium-sized manufacturing concern in East Tennessee. Must read blueprints and supervise patternmaking. Send complete resume including experience, age, references, and salary requirements. Address: Box 551, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CASTINGS SALES ENGINEERS

Expanding, modern gray iron foundry wants aggressive sales engineers for Ohio, Indiana, Michigan territories. Foundry sales experience, mechanical or metallurgical background preferred. Send complete resume. Confidence respected. Interview will be arranged. Address: Box 568, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOREMAN

We are looking for an energetic, experienced foundry foreman for our molding and melting department. This is a medium-sized mechanized foundry located in New England doing squeezer and rollover work. Excellent opportunity to grow with the organization and eventually take full charge. Kindly list your experiences. Address: Box 575, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

For the night shake-out crew in a gray iron foundry producing castings from 1,000# to 12,000# in size. Not over 45 years of age. Address: Box 589, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN DRAFTSMEN

Experienced in the design of pattern equipment, core boxes, qualifying fixtures, and gauges.

Excellent Salary
Permanent Position

Unlimited opportunities with a large, gray iron foundry in Northwestern Ohio.
Write stating qualifications or phone:

PERSONNEL DEPARTMENT
DEFIANCE PLANT — CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORPORATION
DEFIANCE, OHIO
Phone: Defiance 2-2915

OVERSEAS OPPORTUNITY

Minimum of Eighteen Months Service

Melters, molders, coremakers, men with general foundry training to staff new operation in South America. Experience with automotive and malleable castings desirable. Send complete information, including salary requirements and recent photo.

BOX 521, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PATTERNMAKER

For permanent, steady position with fast growing construction equipment industry in mid-west. This is a position with a real future for someone who is looking for a position with a smaller firm where every skilled worker is important. Address: Box 557, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Gray iron jobbing foundry in New England seeks man thoroughly familiar with all phases of foundry operation. Send complete resume of qualifications, experience, references, salary requirements and age. Address: Box 576, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

LAYOUT MAN

For metal pattern shop. Paid vacations and holidays. Steady employment. PROCESS PATTERN & ENGINEERING CO., INC., 1707 N. HARRISON ST., FORT WAYNE, INDIANA.

WANTED

Experienced cleaning room foreman wanted for gray iron foundry making small castings. Address: Box 594, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

ENGINEER—SALES, MANAGEMENT

Mechanical engineer, early thirties. Varied experience in production problems, plant and design engineering; gray iron and steel. Energetic and persevering. Presently employed in an executive position. Prefer midwest location. Address: Box 572, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER
SUPERINTENDENT OR SALES

Thirty years' experience in all phases of foundry operations. Malleable or gray iron. Desire to make change. Presently employed as plant superintendent. Address: Box 592, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Gray and alloyed iron. Progressive and thorough with every phase of foundry operation from purchasing of raw material through production of finished product with extensive background of practical and technical experience. Address: Box 573, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 596, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT
Age 40, available immediately. Eleven years superintendent, seventeen years supervision. Heavy on mechanized equipment gray iron or malleable. Job and captive shop experience. Will relocate. Would also consider sales. Address: Box 584, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER
Desire new connection with progressive organization. Extensive technical and practical background in Melting through Shipping. Haven proven record in costs, scrap reduction, quality control, and labor relations. Age 41. Address: Box 562, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MELTING PROCESS and/or REFINING INVESTIGATION WORK WITH TITANIUM WANTED
By metallurgist widely experienced with production of electric steels, stainless and highly alloyed metals. Have conducted published investigations. Good practical and technical background. Address: Box 564, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKS MANAGER-SUPERINTENDENT
Capable of operating a 350 man organization. 23 years of experience in casting ferrous and nonferrous metals in sand, permanent and investment molds profitably. Address: Box 577, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT
Age 42, college. Capable of complete charge. Thoroughly familiar with all phases of ferrous and nonferrous sand casting to five tons. Now operating 1,000 ton per month shop. Desire change. Address: Box 579, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

AMBITIOUS YOUNG EXECUTIVE
Desire challenging position at top management level. Experienced in all phases of gray iron foundry operations, both jobbing and production, as foundry engineer, sales engineer, superintendent and manager. Strong on methods, incentives, quality control, organizational procedures, labor relations and goood foundry practice. Address: Box 585, FOUNDRY, Penton Bdlg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 569, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METAL CONTROL SPECIALIST
Metallurgist with 23 years' charge production and quality control electric steels including stainless and DCI available for establishing new installation and/or setting up quality metal control practices. Established, successful background. Address: Box 563, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER AND METALLURGIST
Presently managing gray iron foundry seeking new affiliation with progressive gray iron or malleable foundry or sales organization. Experience in management, technical, sales and operational phases of gray iron and malleable. Age 35. Address: Box 586, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES POSITION
Ten years' experience selling coke and foundry supplies and equipment. Four years sales manager. Presently foundry superintendent. Desire to relocate. B.S. in Metallurgy. Age 38. Address: Box 582, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN
Twenty years' experience in all phases of this work. Inspection and shipping. Gray iron and steel. Large and small castings. Married. Will relocate, best of references. Address: Box 555, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CASTINGS INSPECTOR AND EXPEDITER
Twenty years' experience in all phases, gray iron and steel, small and large castings, in or outside plant work. Married, will relocate. Address: Box 556, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ATTENTION: GRAY IRON FOUNDRIES
Progressive young man, 50, married, in good health, desire position as foundry foreman. Thirty-two years' genuine practical experience in all phases of foundry operations, including supervision. (All with two companies.) possess excellent leadership ability. Now employed, but desire to relocate. Top references. Address: Box 591, FOUNDRY, Penton Bdlg., Cleveland13, Ohio.

Positions Wanted

STEEL FOUNDRY METALLURGIST
Metallurgist with thorough background in producing Aircraft quality castings. Desire position in Colorado, Idaho, Oregon, Washington or California. Especially qualified in production of steel with some experience in production of Nonferrous castings. Experienced mainly with Sand Castings; however, have some knowledge of Shell Molding and Investment Casting. Also experienced in Heat Treating. Address: Box 561, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TECHNICAL SUPERVISOR
Research development trouble shooting and quality control metallurgist. Industrial engineer with advance degree and sixteen years' experience. Desire responsible position with progressive gray iron or malleable foundry. Presently employed. Address: Box 570, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN
Thorough knowledge of all phases of nonferrous metals. Also in ornamental, architectural and tablet casting. Green, dry or French sand. Age 50, 36 years' experience. Desire to make change. Address: Box 541, FOUNDRY, Penton Building, Cleveland 13, Ohio.

BUSINESS ADMINISTRATOR—MANAGER
Foundryman seeks management position with progressive company. Accounting and technical training. Fifteen years' experience all phases of foundry, cost, estimating, buying. Address: Box 533, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN
Fifty years old, operated own foundry. Prefer outside, calling on foundries, metals, sand, supplies, equipment or what have you. Located, Ohio. Address: Box 574, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHEMIST
Long experience foundry and steel plant materials, ferrous and nonferrous metals. Address: Box 544, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumbers supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 528, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN
Gray iron or nonferrous. Familiar with every phase of the foundry, background of practical and technical experience. Now employed as superintendent. Address: Box 560, FOUNDRY Penton Bldg., Cleveland 13, Ohio.

WHAT HAVE YOU
Foundryman 26 years job foundry, gray iron and nonferrous experience. Some college. Some foundry teaching experience. Now employed. Would consider foreign employment. Address: Box 547, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN
Dynamic, progressive, mature, permanent mold aluminum foundry operator now available. Can handle sales quotations, mold design, mold manufacturing, casting production. Address: Box 559, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGEMENT
Familiar with all phases of gray iron manufacture, production control, sales, cost and general accounting. Six years' management experience. Age 30. College graduate. Address: Box 553, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN
Gray iron and nonferrous. Prefer jobbing or captive shop. Very capable in all phases of the foundry. Casting from small up to ten tons. Twenty years of practical and technical experience. Age: 38, now employed as foundry foreman. Address: Box 583, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER
Practical, progressive and technical trained foundryman. Well versed in all departments of ferrous jobbing shops, on castings up to 25 tons. Cost and quality minded. Excellent labor relations. Age 46. Now employed. Address: Box 538, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN SHOP SUPERVISOR
26 years' varied job shop experience, automotive, plaster, plastics, 42 years of age. Supervisory experience. Premium rated lead-man. Interested in pattern engineering, new methods and materials. Presently employed. Wish to relocate. Address: Box 514, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

EXPERIENCED FOUNDRYMAN
Desire position in supervisory capacity with progressive company. Age 40, married. Fifteen years' experience, ten years as supervisor. All phases—jobbing, semi-production and mechanized foundry practices in gray iron, ductile and high tensile irons. Address: Box 593, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL MANAGER
Nonferrous, all phases including metallurgy. Top qualifications, reputation and references. Desire permanent position with good stable concern. Address: Box 531, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER-SUPERINTENDENT
Technically trained in all phases of ferrous foundry practice. Degree in Metallurgy. Seek permanent position with a progressive organization. Presently employed in responsible position. Prefer locale east of the Mississippi. Address: Box 595, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultant

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

Representatives Wanted

RARE AND FINE METALS, ALLOYS, CHEMICALS
Salesman with industrial clientele wanted on HIGH COMMISSION. Write complete personal and sales data in confidence. Include photo. BRAM CHEMICAL CO., 820—65th AVE., PHILADELPHIA 26, PENNSYLVANIA.

SALESMEN
Calling on foundries to carry two nationally advertised lines. Items used in core blowing. Repeaters. Commission, state territory. Address: Box 581, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representative Available

REPRESENTATION AVAILABLE
An active sales organization desires to exclusively represent in New York Metropolitan area and New Jersey on aluminum, brass, bronze, malleable iron, ductile iron and diecast foundries. Interested in only those foundries which have facilities for permanent mold, shell casting and other modern methods.

BOX 566, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

Opportunity

PERMANENT MOLD METHOD AVAILABLE THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

Employment Service

SALARIED PERSONNEL
$5000-$30,000. This reliable service established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P.O. BOX 674, MANCHESTER, VERMONT.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Wanted-To-Buy

Wanted-To-Buy

BUYERS **SELLERS** **REFINERS**

BISMUTH

SCRAP: NICKEL—COBALT—CHROME—TUNGSTEN—MOLY.

CADMIUM

WE PURCHASE: ALLOYS, SLAGS, SKIMMINGS, DROSSES, RESIDUES, OFFGRADE AND SURPLUS MATERIALS

ALLOY DIVISION
UNITED REFINING & SMELTING CO.
2920 W. CARROLL AVENUE
CHICAGO 12, ILLINOIS

PHONE: SACRAMENTO 2-3300

WANTED TO BUY

"San-Blo Model CB-40-D Core Blower.

Box 580, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

FOUNDRY WANTED

Interested in purchasing Aluminum and Brass Foundry in New York Metropolitan area grossing $200,000 plus. Will consider partnership. Replies confidential. Address: Box 545, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED TO BUY

One #5 Whiting Cupola, Machanical Charger and Blower. State location, price and condition. Address: **THE DRAKE MANUFACTURING CO., INC., FRIENDSHIP NEW YORK.**

FOUNDRY WANTED

Want to buy gray iron jobbing shop, small to medium size, or will lease captive foundry and supply you with premium castings. Address: Box 549, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Melting furnaces, tilting type, gas and oil fired; Mullers: Simpson, Beardsley & Piper, Clearfield, all sizes. Prompt reply appreciated. Address: Box 527, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRY WANTED

Mid-west company is interested in acquiring a jobbing gray iron foundry capable of producing castings up to 30 tons weight. Northern Indiana, Northern Ohio or Michigan location preferred. Address: Box 546, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

By small foundry B & P 3½ portable Mulbaro. State age, condition and price. Address: FLORIDA FOUNDRY AND PATTERN WORKS, 3737 NORTHWEST 43rd STREET, MIAMI, FLORIDA.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY FOR SALE OR RENT

Ready to operate. Equipped for machine molding. Two cupolas lined to 36" and 24". Also well equipped machine shop. Located in South side Virginia in corner of crossing Atlantic and Danville Railroad and main line of Atlantic Coast Line Railroad. One block from U.S. Highway 301 and U.S. Highway 58. Address: BOX 551, EMPORIA, VA.

FOR SALE

Long established small electric steel foundry. $50,000 cash required. Address: Box 565, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOR SALE

Brass foundry, well equipped, for sale or lease. Address: S. J. STEWART, 527 ST. JOSEPH ST., NEW ORLEANS 12, LA.

For Sale

FOR SALE

Four Osborn Model 2047-3 Rollover jolt molding machines, Serial #10867-BN. Core box 21¼ x 22¼, flask space 11⅛", pattern draw 8". Never used.

TRIPLEX MACHINE TOOL CORP.
75 WEST STREET
NEW YORK 6, NEW YORK

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

For Sale

MUST BE SOLD PRIOR TO REMOVAL
Location: St. Louis, Missouri Area
"SAND HANDLING SYSTEM"
"BUY ALL OR PART"

2—SIMPSON No. 3 Style C Sand Mullers. Enclosed Gears.
1—90 Ton Double Compartment Sand Storage Hopper 9' W x 16' L x 8' O.
1—JEFFREY 50' C to C Bucket Elevator 10" W Belt W/5" x 7" Buckets
3—JEFFREY Trough Conveyors 30" W x 30' L; 30" W x 50" L, & 30" W x 80' L.
2—JEFFREY #1730 Apron Conveyors 48" Wide x 50' Long.

CORE OVENS

5—CARL MAYER 2 Compartment Core Ovens, Gas Fired Recirculating 13' W 7½' H x 14' Deep.

MOLDING MACHINE

1—Herman 6000# Series Jolt Rollover & Pattern Draw, 50" x 60" Table.

SAND BLAST EQUIPMENT

1—PANGBORN No. 45 Type MT Sand Blast Room 10' x 8' x 6' W/8' Dia. Rotating Table.
1—AMERICAN 36" x 42" Tumblast W/Skip Hoist Loader
1—AMERICAN No. 2A Multi-Table Tablast, 10 - 20" Dia. Aux. Tables, 6' Dia. Main Table

BRIDGE CRANE

1—WHITING 5 Ton Capacity Bridge Crane 50' span cab operated W/160' Runway & "A" Frame, AC Voltage

FOR INSPECTION CALL:
MR. ROBERT P. NAGEL
EDWARDSVILLE, ILLINOIS
PHONE: 254W

FOUNDRY CONVENTIONAL SALE
SELL — BUY — TRADE
GUARANTEED MACHINES

Pangborn E.S. 347 Conveyor Cabinet, 4 throwing wheels, used for blasting motor blocks, a beauty, can be seen in operation. $9,000 FOB Det.

Pangborn 14 GK Rocker Barrel	2,500.00
9' LG-14 Pangborn Table	4,500.00
6' LG-14 Pangborn Table	3,000.00
6' LE Pangborn Air Table	800.00
48 x 48 Wheelabrator TumBlast	5,000.00
42 x 48 Wheelabrator TumBlast	2,500.00
26 x 42 Wheelabrator TumBlast	2,000.00
27 x 36 Wheelabrator TumBlast Rubber or Steel Belt	2,750.00
15" Continuous Wheelabrator TumBlast	2,000.00
8' Wheelabrator Table Blast	2,000.00
6' Wheelabrator Table Blast	3,000.00
4' Wheelabrator Table Blast	2,500.00

Vapor Blast Cabinets, singles and doubles.

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
VI-36750
We Will Buy One Piece Or Your Entire Plant

BLOWERS FOR SALE

Spencer—No. Amer.—Stroman

Capacities from 60 to 4500 CFM at 2, 12, 16 and 24 ounces.

Motors for 110/60, 220/440/3/25 and 60 cycle and 230 volt DC.

Let us quote on your requirements!

R. C. CHELIUS
31 PALMER AVE.
KENMORE, BUFFALO 17, N. Y.

FOR SALE

PANGBORN 14-GK-5 ROCKER BARREL SHOT BLAST MACHINE

Complete with motors and controls.

Good operating condition, price $1500.00.

NEENAH FOUNDRY COMPANY
NEENAH, WISCONSIN

FOR SALE

Manufacturer of steam, drainage and soil fittings for over 40 years has suspended operations.

Modern pattern equipment offered for sale.

BOX 587, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

For Sale

FOR SALE

JOHNSTON & JENNINGS 1020 B Jolt Rollover with hydraulic head, excellent condition.
Ingersoll-Rand Air Hoists, one and 2 ton never used. Still in original crates.
American Tumblast 15 x 20 Rubber lined W/DC
Herman Jolt Stripper 48 x 54
Royer Portable Screenarators
Gyratory Riddles
1—Nichols Plain Molding Machine, High Speed.
3—U.S. Variables speed Grinders. Double end. 7½ H.P.
1—Standard Variable speed Grinder, Double end. 7½ H.P.
1—Barrett Cupola, 20" x 10' with air operated skip hoist.
2—Whiting Hydro-Blast Barrels with pumps.
1—Skip Hoist for 36 x 42 Tumblast Machine.
1—Davenport #28 SA Jolt Rollover, Pattern draw.
1—27 x 40 Table with Air Clamps.
2—International Rollovers, Portable.
6—Arcade Model 100S Jolt Squeezers, Stationary.
2—Champion Model JS 10-S Jolt Squeezers, Stationary.
1—International Plain Jolt 36 x 48.
1—International Core Blower SB 13.
3—Milwaukee Squeezers, Stationary.
2—International Squeezers, Portable.
1—Whiting Tumbling Barrel 36 x 72 motorized.
1—Demmler #1 Core Blower.
1—Demmler #2 Core Blower.
1—International SB 11 Core Blower.
1—Ready Sand Unit.
2—Tabor rollover, power, 30 x 40, 12" draw.
3—Snag Grinders AC & DC.
3—Pouring Ladles, geared, 2000 lb. Cap.
Cupola Blowers, all sizes.
Aluminum Core Plates, 16 x 22, 16 x 20, 18 x 24.
Steel Flasks 13 x 22 to 26 x 31.
Wilson Hardness Testers.
Steel Corrugated collapsible stacking boxes. 35 x 50 x 25 deep.
Magnesium and steel Buckets for elevators
Belting, all sizes.
Air Hammers, Grinders and Chippers.

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE
HOMAN MACHINERY COMPANY
710 E. FRONT ST.
CINCINNATI, OHIO
MAin 1-0339

FOR SALE

MOTORS—GENERATORS
TRANSFORMERS
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

FOR SALE

Completely equipped pattern shop including pattern lumber. Can be moved or present location leased. For appointment write: A. L. SEWARD, 816 STAPLES AVE., KALAMAZOO, MICHIGAN, PHONE FIRESIDE 4-5009.

For Sale

FOR SALE

Wheelabrator Cabinet, 2 wheels will handle work 67" x 36"	
Wheelabrator Cabinet with work car	
Wheelabrator skew pipe machine	
Osborn 275PJ	$180.00
Tabor 10" Molding Machine	75.00
Tabor Jolt Pin Stripper, 10"	195.00
Gehnrich & Gehnrich Preheating Oven, 600°F., 6' x 6' x 7' with controls. Unused	750.00
Burring Booth, Newcomb Detroit Magnesium 15 HP motor. Unused	750.00
Uniwash Dust Collector, 5600 C.F.M., Newcomb Detroit 10 HP motor and controls	500.00
American Rotocione sludge type, 2500 C.F.M. with 5 HP motor blower	450.00
#35 American Dustube with 3 HP motor blower, automatic shaker	325.00
American Dustube #85 with 5 HP motor blower, automatic shaker, 1650 C.F.M.	650.00
Ruemelin Sand Blasting Cabinet with turn table 5' x 3'	275.00
McLeod Cabinet, 5' x 3'	200.00
Pangborn 4' Suction Cabinet	175.00
Pangborn 2 GF Barrel	475.00
Detroit, Wilson, Tinius Olsen, Gogan Brinell Hardness Tensile Testers	100.00 up
Climax Wire Cutter, ¼"—$\frac{5}{16}$"	170.00
Wheelabrator Sand Blasting Parts	

M. ELSTEIN
426 GRAND STREET
JERSEY CITY 2, NEW JERSEY

FOR SALE

Lectromelt 250 lb. type "U" side charge electric furnace. Complete, good condition.

BEAVER VALLEY ALLOY FOUNDRY CO.
MONACA, PENNSYLVANIA

FOR SALE

1—Simpson Mixer, #2, 20 HP motor.
Miscellaneous: Screens, Pulverizers, Grinders
Tyler Rotap Screens etc.
Wanted: Your Idle Machinery.
OUR 40th YEAR
CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
OL 9-4425 N. Y. TEL. BA. 7-0600

FOR SALE

American Model "M" Sand Cutter, type 79/60, serial No. 105. Address: THE PARKER-STREET CASTINGS COMPANY, CLEVELAND 25, OHIO, PHONE: MI 1-5350.

MOLDING MACHINE

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston).

For Sale

FOR SALE

MOLDING MACHINES
1—Tabor 22" Power Jolt, Rollover, Draw, Portable, 22" x 32" Table.
1—Milwaukee jolt-squeeze stationary.
2—International Jolt, Rollover Draw, 24" x 10G, Stationary.
2—No. 275 Osborn jolt squeezers. Stationary
2—SPO jolt Squeeze strip—13"
BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 6000 CFM.
1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots Rotary Blowers—27 x 81—1400 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
1—Spencer Turbine Blower, 5400 CFM, 18 oz., 40 HP.
1—Spencer Turbine Blower, 2700 CFM, 27oz., 30 HP, 3/60/220-440-V.
METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld tilting crucible, gas fired, 500# brass.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace barrel type, open flame, oil fired.
1—#2 U.S. rotary melting furnace, 500# brass.
MISCELLANEOUS
1—Hydro-Blast barrel with 25 HP pump.
3—Jib cranes, 16' swinging beam, 2000# cap.
1—Ready Sandy, Portable, Complete.
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 1½ HP.
1—Stoney crane type shakeout.
1—Combs Riddle.
1—NDP Royer sand separator.
1—#16 Roto-clone unit complete.
2—Tumbling barrels, 30 x 42 round.
2—Tumbling barrels, 36 x 54 round.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

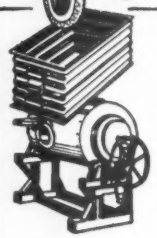
REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-Half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO



OSBORN ROLLOVERS:

5—405 rollovers and pattern draw 18 to 26" draw, air clamps, 3500 lbs. capacity.

TUMBLING MILLS:

1—60" x 72" Ransohoff tumbling type wet cleaning mill, 220/440/3/60

1—36" x 54" Royersford

SWING GRINDERS:

10—10 H. P. Mummert Dixon Model 1814, 220/440/3/60/1800

MAGNESIUM CLEANING CABINETS:

6—Whirlpool Duplex, 800 CFM, 100" wide x 65" deep x 90" high. Buffalo exhausters—7½ HP., 220/440

ASK FOR OUR COMPLETE LISTING!!

GUARANTEED USED FOUNDRY EQUIPMENT

GLENVILLE 1-1222

For Sale

AIR TOOLS—UNUSED & REBUILT
SAVE OVER 50%
UNCONDITIONAL GUARANTEE

REBUILT VERTICAL GRINDERS

Ing. Rand #4F, 4500 rpm. list $280. SPECIAL $125.00

REBUILT BENCH RAMMERS

Ing. Rand #14, list $190.00, SPECIAL $80.00

(UNUSED) CHIPPING HAMMERS

Master #1 ..... list $130. SPECIAL $ 65.00
Ing. Rand #3 ..... list $130. SPECIAL $ 70.00
Cleco #3 ..... list $130. SPECIAL $ 65.00

REBUILT AIR HOISTS

Ing. Rand Mdl. LC5, 500 lbs., List $340., SPECIAL $175.00
Keller Mdl. 861V10, 1000 lbs., List $340., SPECIAL $195.00
Aro Mdl. 7700, 1000 lbs., list $340., SPECIAL $195.00
Ing. Rand Mdl. B, 1000 lbs., list $540., SPECIAL $245.00
Keller Mdl. 86-2v20, 2000 lbs., list $540., SPECIAL $325.00

SEND FOR COMPLETE AIR TOOL CATALOG!
U.S. INDUSTRIAL TOOL & SUPPLY CO.
8960 GREENFIELD, DETROIT 28, MICHIGAN
PHONE: BROADWAY 3-8318

FOR SALE

2—HUTCHINSON SHELL MOLDERS—Model 1424—slightly used, in excellent condition.
3—REDA FURNACES—Model 1000, one never used, two slightly used, in excellent condition.

McBRIDE & SHOFF, INC.
METAMORA, ILLINOIS

FOR SALE

Sermax Blower with Louis Allis 20 HP motor. 3000 CFM at 24 oz.
Sand Mixer, 6 cu ft., paddle type, 3 HP.
Sly Rotary 24" diameter blasting mill.
Fisher blowers and motors, 170 and 350 CFM.
Hydroscale, 2000 lbs.

BARCLAY FOUNDRY, INC.
4239 W. LINCOLN AVENUE
MILWAUKEE 15, WISCONSIN

For Sale

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32oz.	Ing.-Rand	340	20oz.	A-B
4700	32oz.	Ing.-Rand	320	12oz.	Spencer
3800	12oz.	Spencer	9000	6"SP	Northern
2500	7oz.	Sturt.	3420	8"SP	N.Y.
1300	16oz.	Spencer	2700	5⅝"SP	Ilg
800	13oz.	Buffalo	2500	½"SP	American
400	12oz.	Buffalo	1100	4½"SP	Bayley
450	7oz.	Spencer	2344	2"SP	Clarage
400	16oz.	No.Am.			

THE MOTOR REPAIR & MFG. CO
1532 HAMILTON AVE.
CLEVELAND 14, OHIO

USED BUMPERS

McCauley Bumper—26" x 26", 8" Cylinder, 18" Hi
Henderson Bumper—26" x 40", 9" Cylinder, 19¼" Hi

ELECTRIC STEEL FOUNDRY COMPANY
2141 N.W. 25th AVENUE
PORTLAND 10, OREGON

FURNACES AND OVENS

Lindberg Super Cyclone Furnace, 48" x 72", excellent condition.
Tempering Furnace, continuous mesh belt, gas fired recirculating.
Copper Brazing Furnaces, mesh belt, roller hearths. Guaranteed.
WANTED: Used Ipsen, Dow, Lindberg, and Holcroft Heat Treating Furnaces.

METAL TREATING EQUIPMENT
9825 Greeley Detroit 11, Mich.
TOwnsend 8-8450

For Sale

GUARANTEED MACHINES AT LOWEST PRICES

MOLDING MACHINES
213 SPO; 4½" jolt; 13" squeeze
2114 SPO—11" sq.
2136 SPO—13" sq.
720 U Osborn—11" sq.
International PKL—14 x 5½"
Tabor—30" x 40"; 12" draw; shockless—1000 #
2047 Osborn—18" x 24"; stationary
601—602—605 Osborns
Milwaukee Jolt Squeezers; 16 x 20; 4½" jolt
275 J Osborn Squeezers
113 J SPO Squeezers
CORE BLOWERS
Redford—Bench type
#193 Osborn—for medium cores
#94 Osborn—for large cores
FURNACES
2000 lb. Stroman—Tilting Hydraulic
2000 lb. Fisher—Aluminum
350 lb. Detroit Rocker Barrel
CORE OVENS
Dielectric—Model 900A and 1800A
MISCELLANEOUS
20" x 27" American Wheelabrator
Fork Lift Trucks—2000 # to 15000 # cap.
U.S. 7½ HP 3 speed grinders; 28" wheel
Model S Screenerators—B & P
Climax Wire Straightener
Model AA American Sandcutter
Jib Cranes—2 ton cap.
Electric Hoists—2 ton cap.
#42 Osborn Hand Rollovers

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

SPEEDSLINGERS FOR SALE

Two stationary Speedslingers. 12 ft. and 7 ft. 6 In. arms, 22 In. discharge heads, 60 HP Ramming Motors. Includes 30 ton sand bins and Jeffrey Apron Feeders. Available for inspection IN USE through June. Available for shipment in July.

PITTSBURGH STEEL FOUNDRY CORP.
P.O. Box 986
PHONE: Purchasing Department—Glassport, Pa. North 4-7141

CLASSIFIED ADVERTISING RATES

(Effective July 1, 1956)

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

ALL OTHERS — "Help Wanted"—"For Sale"—"Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 22.20	$ 21.00	$ 19.80	$ 19.20	$ 18.60
2 inches	43.20	40.80	38.40	37.20	36.00
3 inches	63.00	59.40	55.80	54.00	52.20
4 inches	81.60	76.80	72.00	69.60	67.20
5 inches	99.00	93.00	87.00	84.00	81.00
6 inches	115.20	108.00	100.80	97.20	93.60
7 inches	130.20	121.80	113.40	109.20	105.00
8 inches	144.00	134.40	124.80	120.00	115.20
9 inches	156.60	145.80	135.00	129.60	124.20
10 inches (1 col.)	168.00	156.00	144.00	138.00	132.00
15 inches (½ page)	243.00	225.00	207.00	198.00	189.00
20 inches (2 cols.)	312.00	288.00	264.00	252.00	240.00
30 inches (full page) ..	450.00	414.00	378.00	360.00	342.00

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

UNIVERSAL

REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS

1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—AMERICAN WHEELABRATOR TUMBLAST, 27" x 36" w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capacity
1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 42"
4—BURRING BENCHES, Magnesium cleaning, 9' L x 30" H x 30" W
1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
10—WHITING 36" x 36" x 72" w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—WHITING 24" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round

CONVEYORS

1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, Car type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
1—JEFFERY, 3 compartment, ingot mold
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS

1—CHAMPION CB-12
3—INTERNATIONAL SB-13
12—DEMMLER #1, #2, #2A, #2K, #3K, #4E, #55
5—OSBORN #92, #192, #193, #9B1, #91-10

CUPOLAS

1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
2—TABOR Cupolettes, 48" dia, 9" cap.
1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control

DUST COLLECTORS

9—ROTOCLONE #12 Type N, #14D, #16W, #20D, Type W 30"

FLASKS

150 HINES AND FREEMAN ALUMINUM, Posoffs and Jackets
200 TRANSITE CORE PLATES, Various sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING

1—250 Lb. LECTROMELT, Side Charge
1—3,000 #/hr. LECTROMELT
1—6 Ton HEROULT

FURNACES—INDIRECT ARC

1—350 #/hr. DETROIT, Complete
1—1500 # DETROIT ROCKER, Complete
1—3000 # DETROIT ROCKER, Complete

FURNACES—INDUCTION MELTING

1—3 KW, AJAX, Lab type
1—20 KW, AJAX SPARK GAP, High Frequency

TO BE SOLD AT ANY PRICE GIVE US AN OFFER

Pangborn Continuous Shot Blast Machine

REPLACEMENT COST OVER $75,000.

5 Wheel Type each wheel driven by 20 Hp AC Motor. Pendulum type #458 chain conveyor for pick up and return, w/motor driven screw type conveyor for shot return to bucket elevator. Complete w/all controls and switches. Serial 51997391. Large lot of new spare parts.

CALL US COLLECT TODAY!

FURNACES—GAS & OIL

1—FISHER MNP, Gas, Tilting, 1700 # cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500 # cap.
1—FISHER MNP, Oil, Tilting, with blower, 500 # cap. Alum.
1—FISHER MNP, Oil, with blower, 1500 # cap. Brass
1—HAUSFELD, Tilting, 1200 # capacity
1—STROMAN, Gas, Tilting, 1,000 # cap. Alum, auto control hyd. lift
1—REDA 550 #. Never Used

GRINDERS

1—GARDNER 12" x 2½" wheels, 5HP
1—HISEY WOLF, Model 4, 16" x 2" wheels, 7½ HP
3—U.S. Model 64, 14" x 2" wheels, 5 HP
1—U.S. Model 66, 14" x 3" wheels, 7½ HP
1—U.S. Model 65, 20" x 3" wheels, 10 HP Swing Frame
1—MUMMERT DIXON, 16" x 2" wheel, 7½ HP
4—22" wheels, 10 or 15 HP
1—CINCINNATI, 5 HP, 2/60/110

MOLDING MACHINES

Jolt Rollover Pattern Draw

2—J & J #918, 44 x 54 Table, 20" draw
2—J & J #815, 30" x 40", 15" draw, 1200 # jolt
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—HERMAN 10,000 #, 48" x 109" table
1—HERMAN 6000 #, 50" x 72"
1—HERMAN 3000 #, 30" x 66" Table
2—HERMAN 1500 #
1—HERMAN 750 #, 30" x 36"
2—OSBORN #602, 36" x 26", 900 #
2—OSBORN #405-86, with leveling carriage
1—OSBORN #405, 3000 #, flask size 64" x 50", 18" draw
3—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000 # capacity
1—TABOR, 30" x 40" w/air clamps, 1000 #
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000 #
2—TABOR 14" x 16" Rockover
1—SPO ROCKOVER #506, 24" x 25" table

Bumpers

3—DAVENPORT, Table sizes 24" x 27", 30" x 30"

Jolt Pin Lift

1—J & J #681-C, 30" x 25" table, 600 # cap.
2—SPO #305, 20" x 27" table, 750 # cap.
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" Table, 600 #
1—MILWAUKEE #1536, 32" x 38", 1500 #
1—OSBORN #559, 25" x 30" table, 6" draw, 1200 #

Jolt Squeeze Pin Lift

2—OSBORN #712, 18" x 28" table, 12" Sq.
1—SPO 2136, 21" x 30" table, 13" sq.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200 #
2—MILWAUKEE #163 15" x 24" table, 11" sq.

Jolt Squeezers

2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL, #12 LJS, 17" x 20" table, stationary and portable
6—TABOR, 3" Jolt, 17x 20"
1—NICHOLS #12 F-P, portable, 600 #
12—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400 #
2—INTERNATIONAL, PKL, 18" x 24" Table, 12" Sq.

MATERIAL HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—MAGNET, 36" Lifting
1—Electric Magnet, 47" x 47", 20" deep
1—CLARK, Fork Lift, Gas, 3000 lb. capacity, Solid Tire

MULLERS AND MIXERS

1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
3—SIMPSON, #0, 3' Dia. 175 lbs. Style M
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch
1—B & P, #40 SPEEDMULLER, with loader, 4'6" Dia., 5 cu. ft. batch
1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.

LADLES AND POURING DEVICES

MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

OVENS

1—COLEMAN, OIL, one compartment, recirc., 60" W x 80" H x 14' 6" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22' x 12' x 10'
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½" x 14' x 7'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L

SAND CONDITIONING

1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
1—ROYER, NB-2, Portable, 7-10 tons/hr. cap.
1—B&P Screenerator, Model M
1—HANDY - SANDY & REDDY - SANDY UNIT—Excellent Buy!

SAND CUTTERS

1—AMERICAN, 15 HP, 60" Reel, 56" Wheel
1—AMERICAN SANDMASTER, 70" x 104", Rubber tires, Very Late Model
1—MOULDERS' FRIEND, 60" Blade

MISCELLANEOUS

1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5

UNIVERSAL MACHINERY AND EQUIPMENT CO.

1632 N. Ninth St., Reading, Pa. **Phone 3-5103**

THE ACME *bargain page*

BLOWERS

Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor. General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
1—Whiting-Allis Chalmers Turbo. 5750 CFM 28 oz. 60 HP 440V air pressure Controls.

CONVEYORS, VIBRATING

36" x 162' Oscillating Pan Link Belt
30" x 53' Oscillating Pan Link Belt

CORE BLOWERS

3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
1—Redford Bench Type.

CORE GRINDERS

3—Milwaukee 70-9.

CORE OVENS

Despatch Type S. 2 cars 27½ x 54 x 64, Gas Fired.
2—Thermonic 900A-1800A.

CORE OVEN VERTICAL HORIZONTAL

1—Coleman, combination oil or gas fired 43 carriers 24" x 90" —1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman combination oil or gas fired 43—2 shelf carriers 30" x 144" long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS

2—Coleman Gas Fired 28'-25" x 42" opening.

DUST COLLECTORS

Rotoclone 24W, 30 HP.

ELECTRIC CRANE & RUNWAY

270' x 50' Crane Runway with A Frame supports and 2 cranes.
1—P & H 5 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.
1—P & H 3 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.

ELECTRIC MELTING FURNACES

Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.
Detroit 350#-750# shells 2300V Primary, Complete with controls.

FURNACE TRANSFORMERS

We have Electric Furnace Transformers in stock from 800 KVA to 2500 KVA. Write us your needs.

FURNACES, ALUMINUM-BRASS

Stroman 1000# hydraulic Tilt-oil.
Stroman 300-400# hand tilt oil-gas.
Eclipse 100# RB stationary gas.
Stroman 350#.
Fisher 1000# BBI Manual Nose Pour.
Lindberg 500# ASM 600.

GRINDERS, SNAGGING

2—Hammond 10 WRI D. E. Snag. 20" dia. wheels, 10 HP 220/440 v motors, variable speed drives.
1—3" x 24" U.S. #65, 20 HP 220/440V.
1—7½ HP Hammond D. E. Snag Grinder.

GRINDERS, SWING FRAME

1—3" x 24" x 12" Marschke, 20 HP.
1—3" x 24" x 12" U.S. 15 HP.

HOT METAL CARRIERS

3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

LADLES

2000# Whiting Jr. & Car.
5000# Modern Geared.

MOLDING MACHINES

Jolt Squeezers:
2—Milwaukee 103-11 Staty. Jolt Squeezers, 13½" x 20" table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18" x 21" table.
1—Osborn 275J.
1—Taccone Model TD4, high production diaphragm molding machine.

Jolt Squeeze Pin Lifts:
6—712 PJ Osborn, 18" x 28" table.

ROLLOVERS

1—Herman 4000# Series 30" x 60" table.
1—Herman 3000# Series 40" x 84" table, special slotted table.
1—Herman 1500# Series 20" x 36" table.
2—Herman 750# Series 20" x 30" table.
2—Herman 750# Series 20" x 24" table.
3—SPO Model 9032.
1—Milwaukee 217, 22" x 42" table.
2—International Type G, Portable, 20" x 8" draw.
3—Tabor Portable Rollover 30".
Johnston & Jennings 1020-44 x 44 max. Flask Size.
Osborn #405 20" x 60" table.

PIN LIFT PUSHOFFS

1—Champion Pin Pushoff 28" x 42" table 10" draw.
2—Milwaukee 620 ND-20" x 24" table.

SPACE HEATERS

3—2,000,000 BTU/hour Model H.D. 2000 Lee oil fired individual space heaters, w/all controls, 15 HP 3/60/220-440V blower motors. Used one season.

MULLERS

Simpson #2 Unit drive
#70 B & P modern cross head, rebuilt.

OVERHEAD TROLLEY CONVEYORS

5000' Jervis B. Webb & Link Belt 678 chain, 4 D.C. motor drive and MG set.

POURING DEVICES

3—Pouring devices, Whiting 500#.

SAND CONVEYORS

144'-30" Flat with Drives.
47'-30" Trough with Drives.

SHAKEOUTS

Link Belt 5' x 10'—7½ HP motor.

TUMBLING BARRELS

3—Roversford 42' x 72' Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x 64.
1—Sly 42" Dia. x 56".

WIRE STRAIGHTENERS

Climax 2A

WHEELABRATORS

48" x 42" American, bucket loader.

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire foundry

126 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois

MONA

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—CHICAGO PNEU., 160 CFM, 30 HP.
1—CHICAGO PNEU., Size 7½ x 6, 20 HP.
1—SULLIVAN WN-3, 1220 CFM, 250 HP.

AIR & ELECTRIC HOISTS

85—INGERSOLL RAND Air Hoists, Sizes RC-5, A, B, C, D, ¼, ½, 1, 2 ton.
15—DETROIT Air Hoists, 1 & 1½ ton cap.
15—APPLETON Air Hose Reels.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.

BUCKET ELEVATORS

2—LINK BELT 35 ft. & 50 ft., 12" x 7" Buckets.
2—NATIONAL 45' & 50', 10" x 7" & 14" x 7" Buckets.

CUT-OFF MACHINES

1—DeWALT ME2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 192, & 193. From 10 lb. to 75 lb. Cores.
8—REDFORD & MILWAUKEE Bench.

CORE OVENS

4—CARL MAYER 2-Compartment, gas fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—MAEHLER SINGLE Compartment I.D. 96" L x 80" W x 84" H, gas fired.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates & controllers.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W. Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—DETROIT ROCKER TYPE AA, 1000 lbs. cap. with 350 KVA Transformer.
1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired. With Motors & Blowers.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225, & 1000. With Gas or Oil Fired. With Motors & Blowers.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired, with motor & blowers.

GRINDERS

Swing Frame

1—MARSCHKE 12" x 2" wheel, 3 HP.
1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.

Snagging

2—U.S. #64, 20" x 3" wheel 7½ HP.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.

Disc

1—BEASLEY #372 Vertical Spindle Dry Grinder, 53" dia., 20 HP, new 1952.
1—QUEEN CITY Model 100 20" x 2" wheel.
1—U.S. #80, 16" x 3" wheel, 7½ HP.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary. 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.

AAA AT THE HOTEL ALMS
May 6-May 10
YOU ARE CORDIALLY INVITED TO BECOME ACQUAINTED WITH THE MEN YOU HAVE DEALT WITH THROUGHOUT THE YEARS
•
CINCINNATI OHIO

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—HERMAN 6000 lb. Series, 42" x 78".
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #217, 35" x 41" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
2—OSBORN #559, 25" x 30" Table.
1—OSBORN #560, 32" x 45" Table.
1—OSBORN #563, 55" x 63" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw Machines. Used with Sand Slinger. Capacity from 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" table.
1—OSBORN #716-PJ, 22" x 34" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26" Table.
1—SPO #2114, 20" x 27" Table.
2—SPO #2136-G, 19" x 26" Table.
1—SPO #2146, 21" x 27" Table.

MATERIAL HANDLING EQUIPMENT

1—HAYWARD 1 cu. yd. Electric Clamshell.
1—EC&M 45" dia. Type SA, Magnet.
3—HOUGH Model HA Payloader, hyd.
1—BLAW-KNOX ½ yd. Bucket.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors to your speed requirements.

Oscillating

3—SIMPLICITY Model OA-10-A, 36" x 15'.
1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80' lengths.

Roller

2500' MATHEWS 6", 22", 24" & 30" wide. Heavy duty, 2 7/8" dia. roller, 1 1/8" hex shaft on 3" & 4" centers. Mounted above rail on 4" channel iron.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24", & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.
2—NEWAYGO Handy Sandy HS-7-GT.

SAND MULLERS

1—B & P No. 3½ Mulbaro, 350# cap.
1—B & P #7 Mulbaro, 700 lb. cap.
1—B & P #30 Speedmullor.
2—B & P #70 Air Cooled, Speed Muller.
1—BAKER PERKINS #16½, 30 HP.
1—CLEARFIELD No. 920, 25 to 30 cu. ft. cap.
1—DRAVO-DOYLE 6 cu. ft. cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
2—SIMPSON #1 Style B, 400 lb.
3—SIMPSON #3 Style C, 3000 lb.
1—SIMPSON #2 Style C, 1500 lb.
3—SIMPSON #3 Style UD, 3000 lb.
1—SIMPSON #0 Style B, 175 lb.
1—SIMPSON #1½ Style C, 700 lb.
1—SIMPSON #1 Style UD, 500 lb.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER, Models, NC-4, NDS.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slinger, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—SIMPLICITY 3' x 5', Model B, 5000#.
1—ROBBINS 8' x 10' Model JF-11 Dual, 16 tons per unit.
1—ROBBINS 3' x 5' portable.
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.

SAND BLAST EQUIPMENT

1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
2—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—PANGBORN 9LF-14—9' dia. Plain Table w/two Roto-Blast units and CH-2 Dust Collector, 4850 CFM. New 1951.
1—PANGBORN #45, type MT Sand Blast Room, 10' L x 8" W x 6' H, w/8" dia. Rotating Table.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD—CLEVELAND 10, OHIO—CALL LI. 1-6545

when a feller needs a friend

Sooner or later, there comes a time "when a feller needs a friend".

Why wait for quality control to tell you that the wrong sand was used? Identify your core and foundry sands with color all can see. Color added to your sand mixes will prevent mistakes.

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Eaton Chemical and Dyestuff Company, 1490 Franklin Street, Detroit 7, Michigan.

Canadian Plants: Toronto and Windsor.
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Circle 835 on Inquiry Card—Page 51

FOR SALE AT BARGAIN PRICES STEEL CASTING PLANT EQUIPMENT

LOCATED AT EAST ST. LOUIS, ILLINOIS

85—Standard Gauge Charging Cars—Standard small Couplers
8—25-ton Bottom Pour Ladles
2—25-ton Ladle Bails
2—Shockless Jolt Strip Molding Machines—16" Cyl. 10,000# Cap.
23—Sand Boxes
Sand Handling Systems and Sand Bins
Dust Collectors
125-ton, 200-ton, 250-ton Hydraulic Straightening Presses
1—Table Type House Blast
1—5 Car Continuous Annealer
4—Single Car Type Heat Treating Furnaces
1—Steam Hammer 8" x 20"
Roller Conveyor
Electric Hoists—Air Hoists—Jib Cranes
15—Electric Bridge Cranes—5 ton to 35 ton
Other Equipment—Write for List—Prints available.
All Equipment in Excellent Condition

HYMAN-MICHAELS COMPANY
2039 E. Broadway, E. St. Louis, Ill., 'Phone: Bridge 1-6300

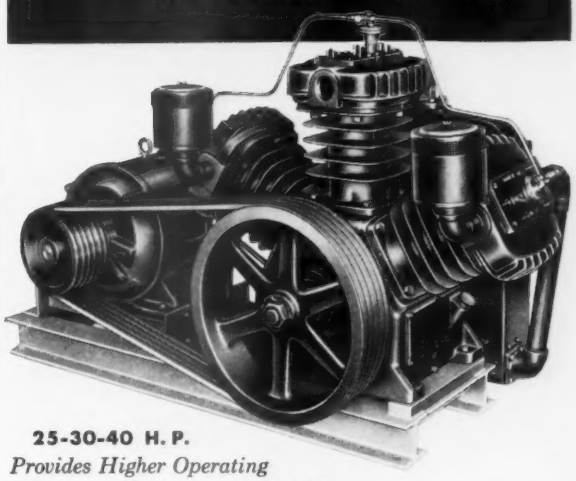
Circle 865 on Inquiry Card—Page 51

CURTIS MODEL C-100

Two-Stage, Air-Cooled Air Compressor

Delivers *MORE* Air...

PER MINUTE HORSEPOWER KILOWATT HOUR OF ELECTRICAL ENERGY CONSUMED



25-30-40 H. P.
Provides Higher Operating Efficiency Costs Less to Install

The Curtis Two-Stage Compressor assures a saving in your power costs. It's air cooled, thereby eliminating expensive water bills—quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

For complete information write for illustrated folder.

YOU CAN COUNT ON REMEMBER...

Curtis

OUR 103rd YEAR
MANUFACTURING COMPANY
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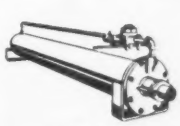

AIR HOISTS
AIR CYLINDERS

AUTOMOTIVE
AIR COMPRESSORS

PACKAGED AND REMOTE AIR CONDITIONING

CM-21

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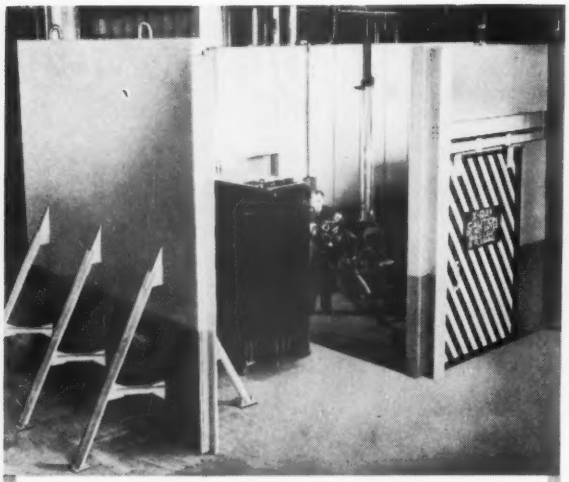

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X-RAY PROTECTIVE ROOM
with PORTABLE WALL

DESIGNED, FABRICATED AND INSTALLED FOR WESTINGHOUSE

Ameray, specialist in the design, fabrication and installation of X-Ray protective materials, has recently completed a 13' x 20' x 12' high X-Ray room to enable Westinghouse to inspect its completed industrial transformers.

Ameray designed the protective room, pictured above, to meet Westinghouse production requirements. The unique feature of this room is the portable wall with supporting legs and lifting hooks (above left shown in remote position) which may be moved to accommodate any sized transformer and still effectively keep X-Ray dosage well below maximum tolerance limits. This 5000 ton lead-lined, steel-faced unit was designed to be handled by existing overhead crane facilities.

Ameray's extensive experience can offer you the best and most economical solution to your particular X-Ray protective problems.

WRITE AMERAY TODAY FOR X-RAY CATALOG #37E. AMERAY WILL BE HAPPY TO DISCUSS YOUR SHIELDING PROBLEMS AT NO COST OR OBLIGATION.

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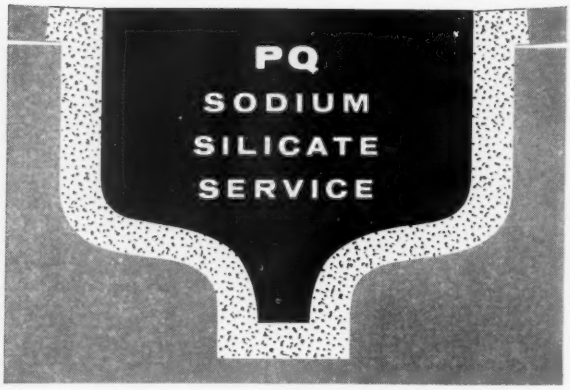

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Over 40 silicates (liquids, solids, hydrated and anhydrous powders). You get the right one for your particular process.

USES

Sealants for porous castings, binders for cements, detergents for metal cleaning, coagulant aid for water treatment.

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From nine plants, Anderson, Ind.; Baltimore, Md.; Buffalo, N.Y.; Chester, Pa.; Jeffersonville, Ind.; Kansas City, Kansas; Rahway, N.J.; St. Louis, Mo.; Utica, Ill. Distributors in over 65 cities.

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1062 Public Ledger Building, Philadelphia 6, Pa.
TRADEMARKS REG. U.S PAT OFF

PQ SOLUBLE SILICATES PQ METSO DETERGENTS

Circle 838 on Inquiry Card—Page 51

SPECO
HEAT-REM
H-170
HIGH HEAT RESISTANT PAINT
Protects Hot Surfaces

WITHSTANDS TEMPERATURES TO 1700°F.

HEAT-REM H-170 stays on where other paints burn off. Its silicone base fuses with surface metal to form an attractive, protective metal coating. It contracts and expands with temperature changes . . . prevents rust and corrosion of hot metal surfaces.

- Aluminum, gold, red and blue
- For brush or spray use, indoors or out
- Recommended for stacks, boilers, steam lines, mufflers, radiators, exhaust manifolds, piping, ovens, compressors, condensers . . . all metal surfaces subjected to high heat AA-5291

WRITE FOR HEAT-REM BULLETIN L-4261

SPECO, Inc.
"REM" PRODUCTS
7308 Associate Avenue
Cleveland 9, Ohio

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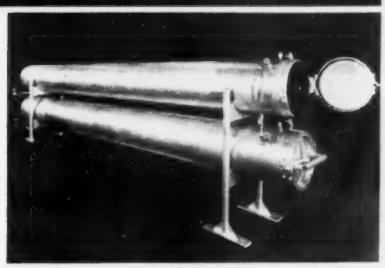

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COMBS GYRATORY RIDDLES

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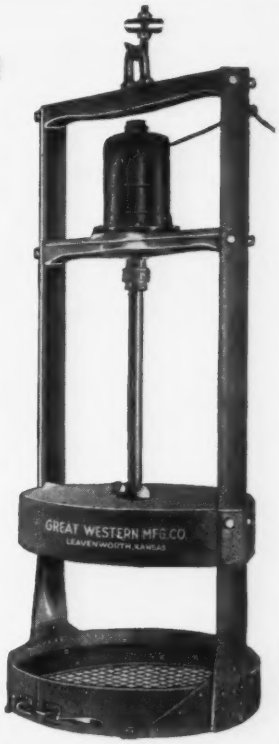

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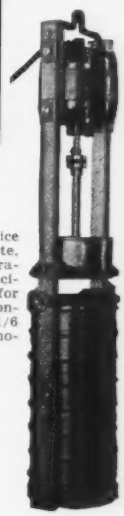

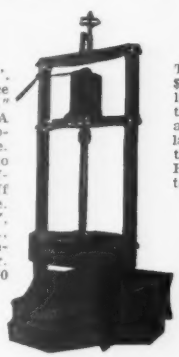

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Next Page Circle 843→

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40 YEARS ENGINEERING PLANNING

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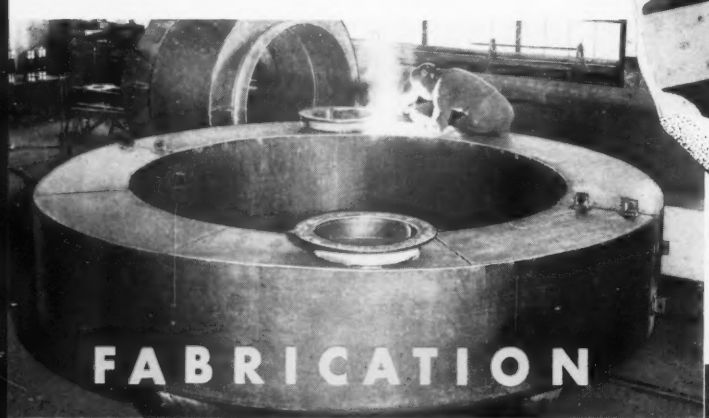

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IN FOUNDRY PRODUCTS

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New and different mold and core coatings for use with the CO_2 process. Can be sprayed, brushed or swabbed. Mixed with Isopropyl Alcohol, the coating will burn dry in 10 to 40 seconds.

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- Stevens Fastick Liquid Core Paste
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CO_2 BINDER

Coats sand grains rapidly — minimum of mulling • Reacts quickly with Carbon Dioxide • Good flowability — Easy to handle • Produces smoother castings • Cores have long shelf life.

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ZIRCON COATING

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Improve working conditions with these treated products

NO DUST IN HANDLING • NON-TOXIC

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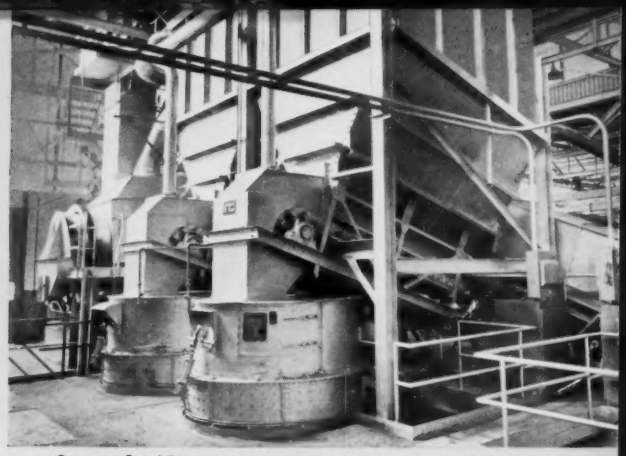
Circle 552 on Inquiry Card

Sand Preparation Plant Showing Storage Bins, Weigh Hopper and Muller.



Compact Sand Preparation Plant in Large Mid-Western Gray Iron Foundry.

Sand Preparation Systems

engineered for YOUR exact requirements

Bartlett-Snow systems assure unvarying uniformity of sand quality — more molds per day — better castings — less scrap — increased production — lower costs.

● Complete facilities include collection of shakeout and strike-off sand — cooling — screening — adequate storage — mixing — aeration and return to molders. Fixed responsibility assures highly efficient synchronized operation of the entire system as a unit. Rugged construction assures low maintenance and low operating costs. Many steel, malleable, gray iron and non-ferrous installations.

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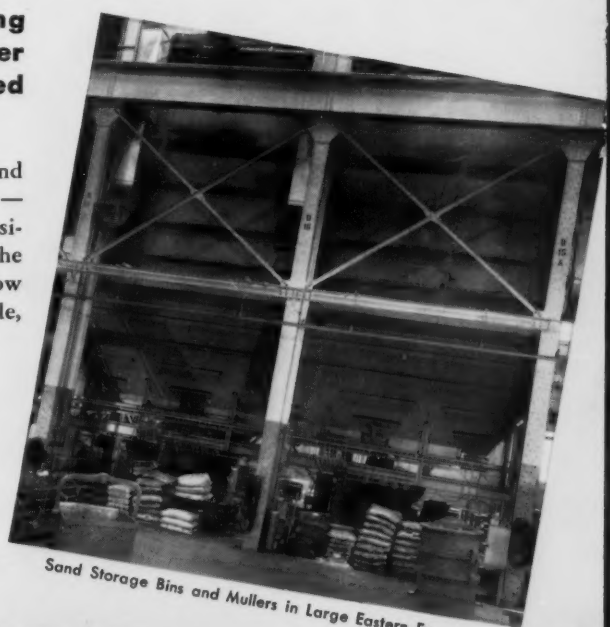
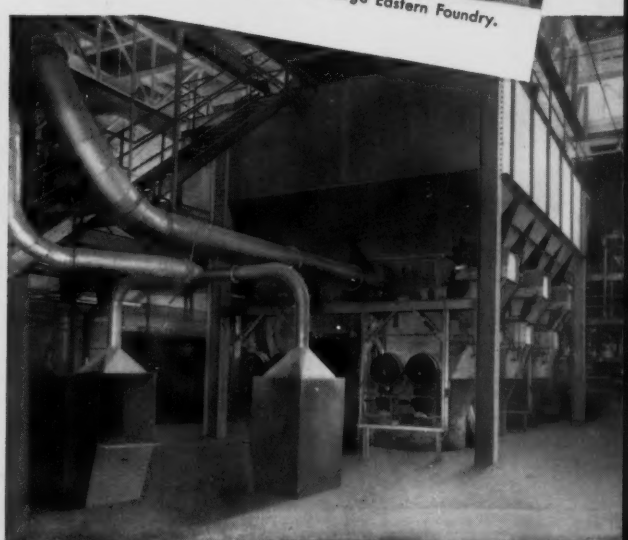


Sand Storage Bins and Mullers in Large Eastern Foundry.

Below—Left: Sand Preparation Plant in Midwestern Malleable Foundry.
Below—Right: Core Sand Preparation Plant in Large Automotive Foundry.